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The IRON AGE

NOVEMBER 13, 1947

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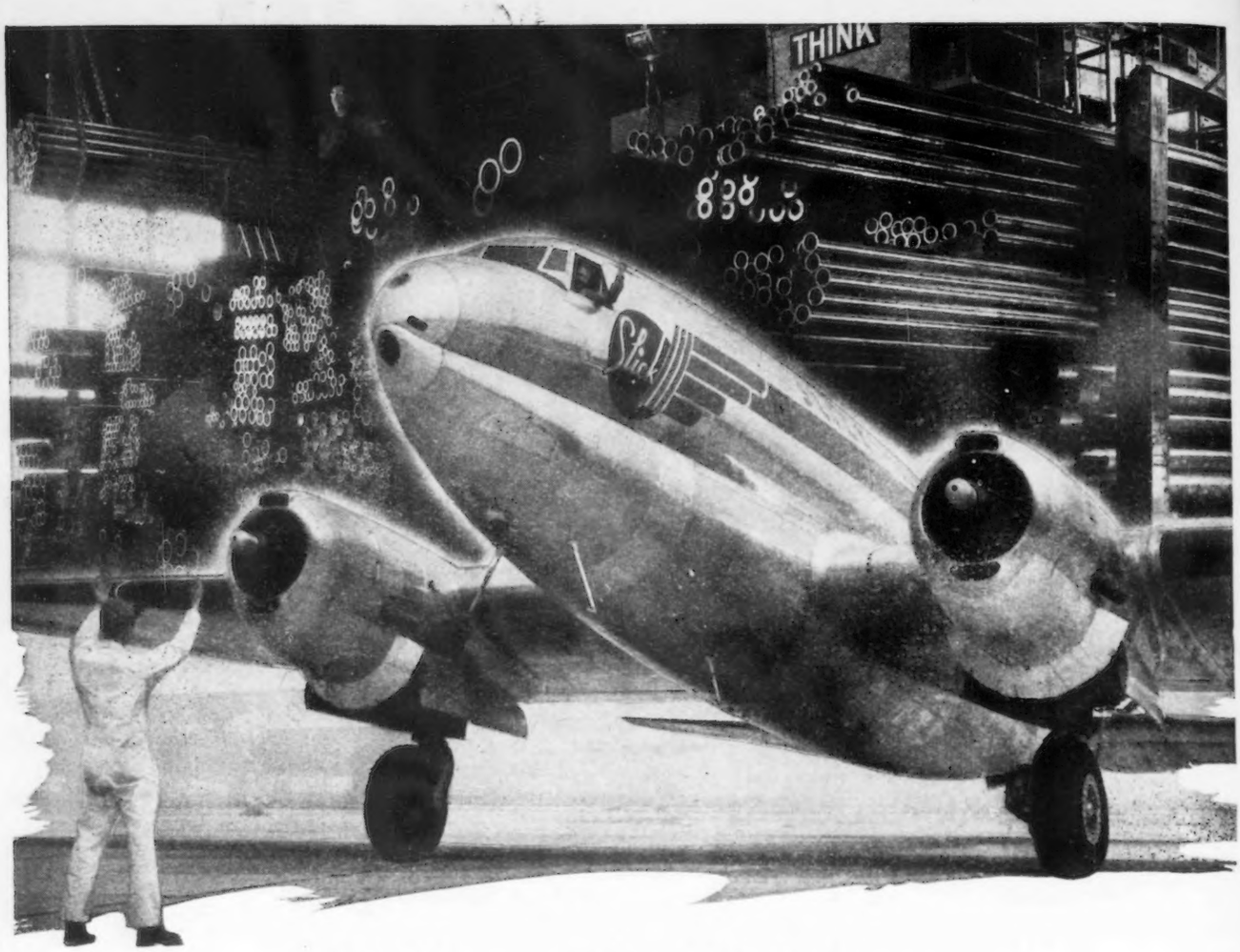

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One World With Two Plans

NOVEMBER seventeenth will be a unique day in history. On that day Congress convenes in special session, with apparent intent to implement Secretary Marshall's diplomatic offensive to win the Battle of Europe, a mere opening struggle in a long campaign to hold the ramparts of Western civilization. In a period of uneasy peace, that day may mark the initial outpouring of wealth such as other countries have equalled only in times of war.

Since Mr. Marshall first propounded his offer to support European recovery, some 215 Congressmen have traveled the length and breadth of that unhappy area. Almost to a man they have returned convinced of the need for long-term planned aid. Meanwhile, the dry statistical bones of the Paris Report—Europe's shopping list—have been critically examined in Washington as to their validity, and cross-checked against the foodstuffs, the raw and manufactured goods available in this country. Thus, when Congress convenes it will have legislation already screened by influential members of both parties. And there will be a large group of sympathetic members who have been abroad and have seen and learned that Europe's problem is not one of laziness and lack of serious purpose, but rather one of immediate refinancing to frustrate short-term starvation and somehow break the vicious long-term downward spiral of industrial and financial disintegration.

There is little doubt but that funds will be made available to keep Europe from starving this winter, even though it may involve going to such extremes as buying some of the Argentine state-owned wheat at the hold-up price of $5 per bushel. Europe is also getting its hands on some more dollars by freeing of the gold looted by Germany and anticipatory purchases of European currencies by American Army authorities.

But for the heart of the Marshall program—the 5 billion or more dollars to be made available for industrial and financial rehabilitation—the debate may extend well into next Spring. That the debate will be bitter and prolonged is to be expected, and a great deal of opposition will crystallize around any Presidential proposals for domestic price and inflation control.

In the meantime Moscow has risen to the challenge of the war of nerves. In Eastern Europe, Mr. Molotov is rapidly implementing his own Plan of Recovery. In Warsaw, Mr. Zhdanov and his newly organized rump Comintern (the Cominform) are engaged in open warfare with the Marshall proposals, the propaganda line being that "Western Europe politicians by their groveling and servility are facilitating the task of American capital, and pushing their countries onto the road of vassal dependence on the United States."

In a cold war of nerves, the side with the stronger nerves, the capacity for quick and forceful action and greater staying power, is most likely to win. The tortuous process of getting Europe back to a state of prosperity and solvency will take years of patient effort, and firm, intelligent and quick decisions. Nor need the climax of the cold war of nerves, of necessity, be the hot war of armed conflict. If in the next several years the recovery in Western Europe is such that those countries east of the Iron Curtain become irritable and dissatisfied with the best Mr. Molotov has to offer, the Kremlin geopoliticians will become more concerned with repression at home than new ventures in communist imperialism.

T. W. Lippert

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► One of the largest implement makers in the midwest will soon start to make many stamped and drawn parts which were formerly purchased on the outside. Parts, such as valve covers, and motor pans will be made on a single-stage die setup which to date has required a five stage die arrangement.

► Warpage, which forces frequent replacement of jet engine exhaust cones may be licked by experiments soon to be conducted. High alloy steel will be experimentally replaced by stainless clad copper for this application. The high alloy steels resist heat conductivity, producing "spot" or unequal heating, and hence warpage. Purpose of the copper in the clad metal cone is to diffuse heat more quickly and more evenly.

► A four-speed French car, the Oengot, on exhibition at the Paris Auto Show, is reported to show an average fuel consumption of 40 miles per gal. Top speed is said to be 72 miles per hr.

► The price of some steel sheet bars in conversion deals is over $100 a ton. One reason: These high priced bars are often made in small acid furnaces with heavy charges of low phos scrap and low phos pig iron which cost as much as $48 per ton. Generally the conversion customer gets a far better steel than he needs.

► British research groups are planning to make what they term a "serious" attempt to develop a continuous casting process for steel. Supplementing this research program, a project for the study of heat transfer from the mold is also under way, while a third study of mold wall strains developed during pouring is also being undertaken.

► Whether from preference or shortages, the trend toward the replacement of cast iron and vitreous china with steel in plumbing has been a strong one since 1939. At that time, only 2.7 pct of plumbing fixtures were made of steel, but so far in 1947 steel accounts for 22.1 pct.

► Although outlawed by domestic codes, large heavy weldments put into service in the un-stress relieved state are being used in South America. These penstocks of welded multiple layers of steel plate have been made stronger and lighter by taking advantage of the compressive stresses induced by the fabrication sequence.

► Responsible officials are not discounting the possibility of new wage demands when this section of the steelworkers' contracts can be reopened April 1, 1948. In fact, they see it as a strong probability if the current price spiral is not halted.

► While iron ore shipments from upper lake ports are nearing the 80 million tons total the industry experts predicted, iron ore is very tight and a new consumer entering the market at this time would find it difficult to buy a tonnage.

► The National Advisory Committee for Aeronautics is now conducting experiments with the use of ceramic impellers for gas turbines as the operating temperatures need to go constantly higher.

► A sudden wave of enthusiasm over the sale of British automobiles to the U. S. has hit the workers at the Austin factory in Birmingham, England. Special labels are attached to components and cars on the assembly lines, with apparent success in spurring workmen to greater efforts.

► Detroit is experiencing a lull in tool and die work. There are no outstanding tooling programs under way at the moment. The introduction date of the new Ford models has been set back another two months, and Chrysler is only beginning to send out its engineering drawings for new tooling estimates.

► The Kettering high compression engine is advancing more rapidly than its original sponsors hoped for. Detroit now guesses that these engines are only 2 or 3 years away and with favorable developments in the production of high octane fuel the new engines may come even sooner. Where the optimum compression ratio is used, cars are expected to run more than 40 miles per gal through city traffic.

► After 18 months of operation Bundy Tubing Co. of Detroit makes the following report on its plan for sharing savings in labor costs with employes: Increased production, reduced absenteeism, less labor turnover, less scrap, and the payment of $829,000 to employes as their share of the labor savings.

► The Dutch-government sponsored merger of the three aircraft companies in that country—Fokker, Aviolanda, and DeSchelde, resulting in a new company has been accomplished. The new company is producing new aircraft types, busses, and gliders, and will build a new factory next year to employ 2 to 3 thousand workers.

Evaluation of Openhearth

THE manufacture of steel in an openhearth furnace has never been developed into a science—it is still an art. As long as it remains an art, the man who operates the furnace will continue to be the controlling factor in the manufacture of openhearth steel. It is doubtful, since the time of Siemens, that there has ever been an openhearth superintendent or a superintendent of masonary who has not at some time evolved a checker arrangement which he believed was going to be the solution of the checker problem for all time.

This has brought about a multiplicity of checkers of different sizes and arrangement in the checker chamber. Basically there are only two arrangements, the chimney and the open flue. The best known of the chimney type is the basket weave. This was in use as far back as 1923. The basket weave and open flue arrangements are illustrated in figs. 1 and 2.

Except where special tile are used, the chimney or basket weave assembly does not lend itself to different arrangements. This is not true with the open flue. Variations of this type of installation are too numerous to be described here. Two of these variations are illustrated in figs. 3 and 4.

In order to complete the picture one special tile is included, fig. 5, the "SP" checker, a type of checker which has been in service both in this country and abroad. Two furnaces in this country have been equipped since December 1944 without being torn down and only the top two courses renewed each year.

The evaluation of checkers falls under two headings: (1) The arrangement of the checkers and (2) the size and type of checker to be used. Unfortunately, one dovetails into the other so that it is impossible to separate them. In general, the four major points to be considered are:

(1) Cleanliness
(2) Stability
(3) Expansion and contraction
(4) Effectiveness

The term *effectiveness* has been used rather than *efficiency*. J. H. Chesters in his book on "Steel Plant Refractories," states, in part, that it is extremely difficult to carry out a heat balance on an openhearth furnace. And that while formulas for the calculation of efficiency exist, the number of assumptions and approximations which must be made may well lead to errors of greater order than the actual differences between the efficiencies of the types considered. Effectiveness, on the other hand, is a purely mathematical calculation which takes into consideration the shape of the checkers and the method of installation.

Considering the factor of cleanliness, it appears that with the exception of the top course, there is no doubt that the basket weave assembly has the best chance of retaining a clean flue. This question of clean flues is becoming of greater impor-

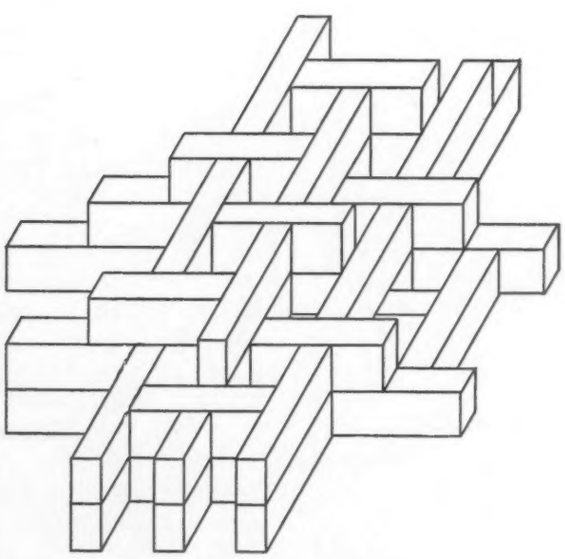

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FIG. 1—A typical basket weave checker arrangement.

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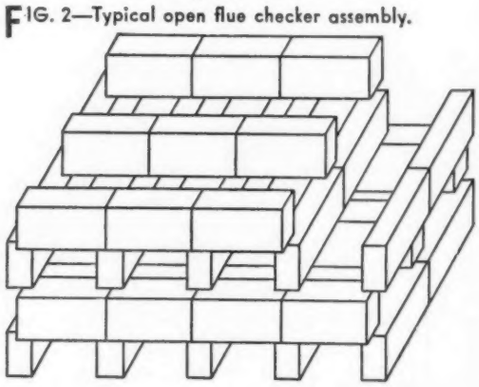
BELOW

FIG. 2—Typical open flue checker assembly.



Checkers • • •

By WALTER B. BRYANT

An evaluation of various arrangements and sizes of openhearth checkers, from the viewpoints of cleanliness, stability, expansion and contraction, and effectiveness, is made in this article. The discussion covers the more common arrangements and also a special type tile, and gives actual performance data covering 11 installations of various types of checkers.

tance due to betterment in furnace roof construction. The serviceability period of checker brick assemblies is lagging behind the furnace roof life due to the necessity of tearing down the checkers to eliminate the restriction in the flues caused by the collection of iron oxide.

The main objection to the basket weave construction is the smallness of the flue which, in turn, limits the square feet of free area per square foot horizontal checker area. This is illustrated in table I, lines 2, 3, 4, and also in fig. 10. In a good many installations, this restriction in free area would not be good practice. It is possible to go to an 18x6x3 in. or an 18x6x2½ in., but under the $70.00 base these tile cost in excess of $400 per M. To get around this high cost two 9x4½x3 in. laid butt to butt to make up 18. in. have been used. The grave disadvantage in doing this is lack of stability.

The open flue assembly is dirty. The exposed top surface of each checker is a dust collector. This, in itself, would not cause the shutting down of the furnace to clean checkers. As an example, using a 9x4½x3 in. checker, the percentage of brick volume effective for heat absorption (see line 5, table I) is 79.8 pct with clean flues. After dusting this drops to 73.2 pct or a loss of 6.6 pct. This loss is relatively small, but what actually happens is that this buildup on the top surface of the checker does not stop with covering the top surface, but continues over into the flue, causing at least a partial closure. Blowing the horizontal flues helps this condition, but unfortunately in so many cases approximately two thirds of the chamber is below floor level and cannot be reached.

This continual tear down and rebuild is expensive. To give some idea of this expense, reference is made to table II. The installations covered in table II are all in actual service. Reference is made to installations 3, 6, 7, 8 and 9, table II. These are examples where brick have been taken out and reinstalled. The labor costs shown are an average obtained from four melt shops. Cost for tearing down and installing new checkers —$19.75 per M 9 in. straights. Cost for cleaning old checkers—$17.40 per M 9 in. straights. For years, the advisability from a cost standpoint of cleaning brick has been a controversial subject. If there was any basis for argument in 1922, how much more weight must this carry now when in

FIG. 3—An open flue arrangement with alternate courses staggered.

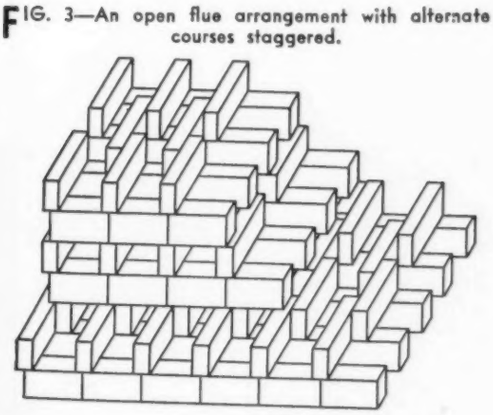
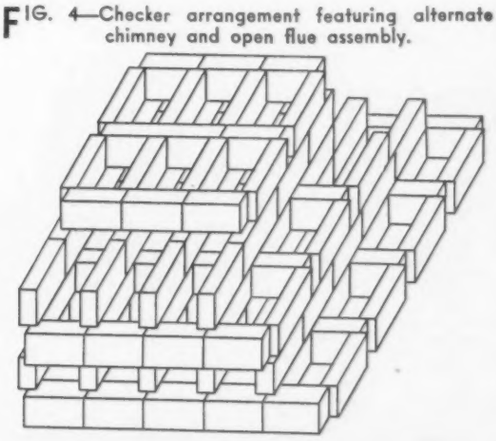
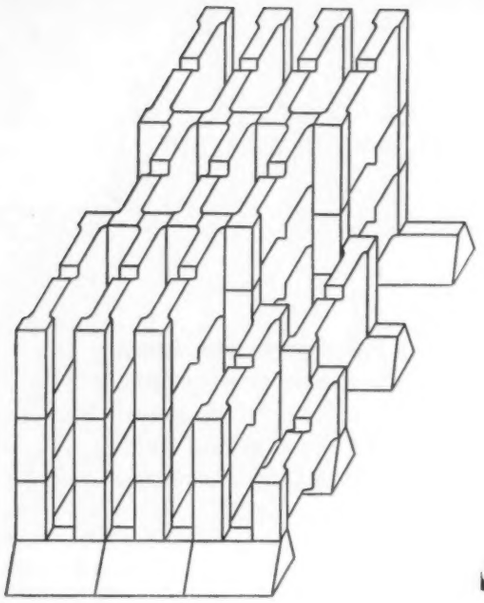


FIG. 4—Checker arrangement featuring alternate chimney and open flue assembly.





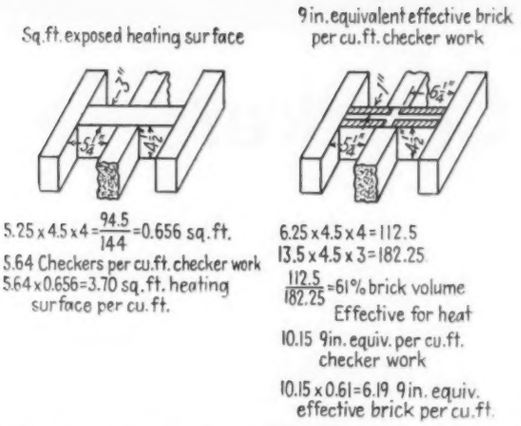


FIG. 6—A comparison of exposed heating surface and 9-in. equivalent effective brick for the basket weave assembly. Checkers are 13½x4½x3 in.

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FIG. 5—A special type tile, the SP checker, is shown here in a chimney assembly.

the steel mills common labor is averaging $1.15 per hr. Another argument against the reuse of cleaned brick is that after protracted length of service, a checker loses its ability to absorb and emit heat. There seems to be very little basis for this contention, except where brick has been glazed. J. H. Chesters quotes definite data on the comparison of new and used checkers.

Comparison of New and Used Checkers

	New		Used	
Heat Capacity*	0.49		0.50	
		Skin		Inside
Porosity	26.3	21.3		37.0
Bulk density	1.96	2.09		1.93
Specific heat (from 750°C) c.g.s. units	0.25		0.25	
Diffusivity factor**	4.3		4.6	
Thermal conductivity (heat face 700°C) Btu.	6.2		6.6	
Cold crushing strength, lb per sq in.	2350.0		4960.0	

*Heat Capacity = specific heat x density.

**Diffusion Factor = thermal conductivity — (bulk density x specific heat)

With respect to the heat capacity figures, it might be pointed out (something that has not been given sufficient emphasis in this country) that a de-aired brick will give a higher bulk density and hence a greater heat capacity.

With the basket weave construction there is stability. The entire lower surface of the checker is supported on the top surface of the checker below. Unfortunately the checkers are only held in place at the middle and there is nothing to prevent a turning movement at the ends. This causes the formation of shelves and the collection of dust. With the open flue construction, the checkers are beam supported. The only points of contact with the checkers below are at the ends. Too much emphasis has always been placed on the P.C.E. value of a fire brick and not enough upon the softening point, which may be anywhere from 100° to 300° lower than the P.C.E. value. A brick supported only at the ends may easily slump at the center before the melting

TABLE I

A Comparison of Various Checkers and Assemblies

Checker, in.	Size of Vertical Flue, in.	Type of Flue	Number of Pieces per Cu Ft Chimney Work	9 in. Equiv. Each Piece	9 in. Equiv. per Cu Ft Checker Work	Sq Ft Exposed Heating Surface per Cu Ft Checker Work	Effective Heating Surface Sq Ft per Cu Ft Checker Work	Sq Ft Free Area per Sq Ft of Horizontal Checker Area	% Brick Volume Effective for Heat Absorption	% Loss Heating Surface Due to Dusting	% Effective Heating Surface After Dusting	9 in. Equiv. Effective Brick per Cu Ft Checkers
SP	4x10½	Chimney	4.00	1.80	7.20	4.67	4.67	0.58	100.0	0.0	100.0	7.20
13½x4½x4½	4½x4½	Basket weave	4.74	2.70	12.80	2.66	2.66	0.30	36.2	0.0	100.0	4.63
13½x4½x3	5½x5¼	Basket weave	5.64	1.80	10.15	3.70	3.70	0.40	61.0	0.0	100.0	6.19
13½x6x2½	5½x5½	Basket weave	4.50	2.00	9.00	4.12	4.12	0.43	77.0	0.0	100.0	6.93
9x4½x3	6x6	Open	4.74	1.20	5.69	3.85	3.26	0.44	79.8	15.3	84.7	4.49
9x4½x2½	6½x6½	Open	4.74	1.00	4.74	3.73	3.20	0.52	88.3	14.3	85.7	4.19
10½x4x3½	7x7	Open	3.93	1.46	5.74	3.63	2.96	0.44	75.5	18.4	81.6	4.33
10½x4½x3	7½x7½	Open	3.48	1.40	4.87	3.37	2.83	0.51	80.0	16.1	83.9	3.89
13½x4½x4½	9x9	Open	2.10	2.70	5.67	2.94	2.36	0.44	64.6	20.0	80.0	3.46
13x4x3½	9½x9½	Open	2.56	1.80	4.61	3.02	2.44	0.49	76.1	19.5	80.5	3.50
13½x4½x3	10½x10½	Open	2.10	1.80	3.78	2.69	2.23	0.60	80.4	14.7	83.5	3.04
13½x6x2½	11x11	Open	1.58	2.00	3.16	2.38	2.08	0.66	86.4	12.7	87.3	2.73

TABLE II

Comparison of Values of Checker Chambers of 11 Actual Installations

Installation	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
Fuel burned	Oil	Oil	Oil	Oil	Oil	Oil	Tar and coke oven gas	Producer gas	Natural gas	Oil, tar and natural gas	Oil
Furnace capacity as built, tons	75	75	75	200	60	140	90	90	50	80	175
Present output per heat, tons	130	135	122	200	165	180	145	145	110	164	225
Average output per year, tons	93,600	97,200	87,800	120,000	105,000	108,000	104,000	104,000	85,800	98,400	135,000
Checker brick size, in.	13½x4½x3	9x4½x3	13½x6x3	13x4x3½	9x4½x3	10½x4½x3	12x4½x3	9x4½x3	9x4½x3	13x4x3½	SP
Type of installation	Basket weave	Open flue	Open flue	Open flue	Open flue	Open flue	Open flue	Open flue	Open flue	Open flue	Chimney
Size of flue, in.	5¼x5¼	6x6	7x7	9½x9½	6x6	7½x7½	9x9	6x6	6x6	9x9	4x10½
Area of flue, sq ft	0.191	0.250	0.350	0.627	0.250	0.390	0.562	0.250	0.250	0.562	0.291
Checker volume one side, cu ft	3,815	3,848	3,679	4,157	3,675	5,442	4,893	4,822	3,982	4,227	8,387
Free area, sq ft	237	259	200	293	198	284	303	243	175	243	387
Total checkers one side	21,505	18,500	8,019	10,876	18,000	19,542	12,964	23,637	19,214	12,836	34,589
9 in. equivalent	38,710	22,100	19,245	19,576	21,600	27,919	20,964	28,724	23,056	23,104	64,585
Heating surface, sq ft	13,829	14,814	12,141	12,554	14,400	19,304	14,585	19,204	15,612	15,936	41,857
9 in. equiv. effective brick	23,613	17,717	13,833	14,547	17,237	15,243	16,640	22,922	18,400	17,162	64,585
The following costs have been based on the cost per 1000 9 in. equivalent. Figures cover one furnace.											
Initial cost—checkers	$171.18	$141.80	$171.72	$171.62	$149.36	$167.06	$217.22	$148.16	$149.58	$172.52	$340.00
Maintenance cost—new brick	101.00	72.30	65.07	94.70	81.66	111.38	162.92	309.96	119.67	102.08	152.60
New brick installed—labor	62.72	58.36	34.94	61.18	61.06	44.40	69.24	119.31	71.21	63.20	60.80
Cleaning brick—reinstalled	.....	.....	84.48	.....	.....	96.57	164.70	64.56	238.80	.....	.....
	$334.90	$272.46	$356.21	$327.50	$292.08	$419.41	$614.08	$641.99	$579.26	$337.80	$553.40
Cost per year per furnace	$111.63	$108.96	$197.88	$218.33	$249.64	$279.60	$982.52	$641.99	$579.26	$168.90	$55.34
Cost per ton ingot steel	0.119¢	0.113¢	0.225¢	0.182¢	0.237¢	0.258¢	0.945¢	0.617¢	0.675¢	0.172¢	0.041¢

point is reached. Of the two types of construction, the open flue is the least stable.

Both the basket weave and open flue construction suffer from the same defect with respect to expansion and contraction. The checkers are laid in line, butt to butt. When first installed a gap is left for expansion between the ends of the checkers. Unfortunately this gap soon fills with dust. With the normal temperature at the top courses, there will be a lineal expansion of ¾ in. in 10 ft of running checkers. In a checker chamber 27 ft long, this will amount to 2 in. This can mean only one thing when the joints fill with dust—checkers forced out of line and the formation of shelves. The designer of the checker chamber shown in fig. 3 has taken cognizance of the above and staggered the lengthwise checkers. This permits each individual checker to expand individually into the adjacent flue.

In dealing with the effectiveness of a checker brick, an assumption must be made at the outset. The time factor of reversal determines the depth of penetration which will be effective. If the period of reversal were constant, the problem would be easy, but this period changes as the heat progresses. This change in reversal period may vary from as much as 70 min. to as low as 2 min. for a minimum. A reversal period of 15 min. has been assumed.

W. E. Greume-Grjimeile in his book, "The Flow of Gases in Furnaces," has covered this penetration for different reversals. These curves and later tests have indicated (based on 15 min) 1¼ to 1 in. as being the effective depth, with modern practice favoring 1 in.

This would indicate that a straight 2 in. tile would be 100 pct effective, and this is true, but unfortunately there is one major objection. Such a tile must of necessity be 6 in. wide to give it body strength. When stood up on the 2-in. edge, it would lack stability. The width of contact

TABLE III

A Comparison of Different Checker Brick Sizes in Same Size Chamber

Checker chamber dimensions—Gas—27 ft 2½ in. x 9 ft 8 in. x 9 ft. Air—27 ft 2½ in. x 14 ft 2 in. x 9 ft.

Reference No.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
Type of installation	Open flue assembly						Basket weave or chimney assembly			
Type of checker, in.	13½x6x2½	13½x4½x3	13x4x3½	10½x4½x3	9x4½x2½	9x4½x3	13½x4½x4½	13½x4½x3	13½x6x2½	SP
Total checkers	8,874	11,832	13,892	18,396	25,776	25,776	25,169	30,100	24,382	21,294
9 in. equiv. each piece	2.00	1.80	1.80	1.40	1.00	1.20	2.70	1.80	2.00	1.80
Total 9 in. equivalent	17,748	21,298	25,005	25,754	25,774	30,926	67,956	54,180	48,764	38,329
Pct volume effective	86.4	80.4	76.1	80.0	88.3	79.8	36.2	61.0	77.0	100.0
9 in. equivalent effective brick	15,334	17,124	19,025	20,603	22,760	24,679	24,600	33,050	37,548	38,329
Heating surface each piece, sq ft	1.507	1.281	1.184	0.968	0.788	0.812	0.563	0.656	0.916	1.172
Total heating surface, sq ft	13,373	15,157	16,448	17,807	20,312	20,930	14,158	19,746	22,334	24,957
Total number of flues	460	460	480	725	1,020	1,020	1,020	1,216	1,292	1,183
Area of flue, sq ft	0.84	0.77	0.63	0.39	0.29	0.25	0.14	0.19	0.21	0.31
Size of flue, in.	11x11	10½x10½	9½x9½	7½x7½	6½x6½	6x6	4½x4½	5¼x5¼	5½x5½	4x10½
Total horizontal free area, sq ft	386	354	301	283	299	255	143	231	271	363

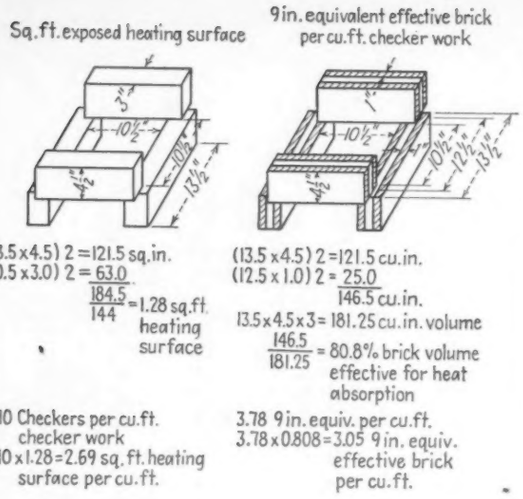


FIG. 7—A comparison of exposed heating surface and 9-in. equivalent effective brick for the open flue assembly. Checkers are 13½x4½x3 in.

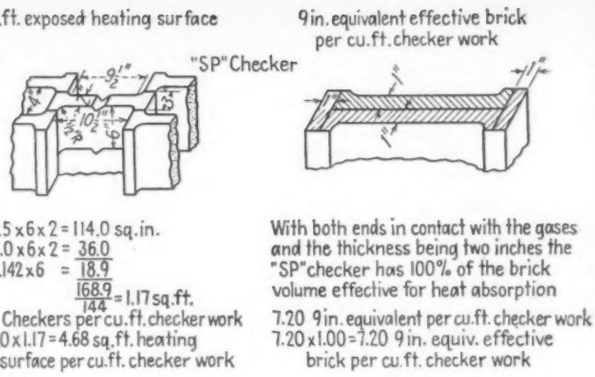


FIG. 8—Comparison of exposed heating surface and 9-in. equivalent effective brick for the SP brick in a chimney assembly.

with the checker below should not be less than 2½ in. and 3 in. is preferable.

While the question of effectiveness has been recognized for years, the calculations were based on the individual checker alone. Table I under the column "pct of brick volume effective for heat absorption" carries the effectiveness one step further, taking into account not only the individual checker but also the method of installation, whether basket weave or open flue. The advisability of this is shown by comparing a 13½ x 4½ x 3-in. basket weave installation with the open flue. The percent of brick volume effective changes from 61 to 80.4 pct.

At first glance the open flue installation of this checker would seem preferable, but when

FIG. 9—Comparative values of the 9-in. equivalent and total heating surface for various sized checkers in the same size checker chamber. Assumed chamber dimensions are: Gas—27 ft 2½ in. x 9 ft 8 in. x 9 ft; Air—27 ft 2½ in. x 14 ft 2 in. x 9 ft.

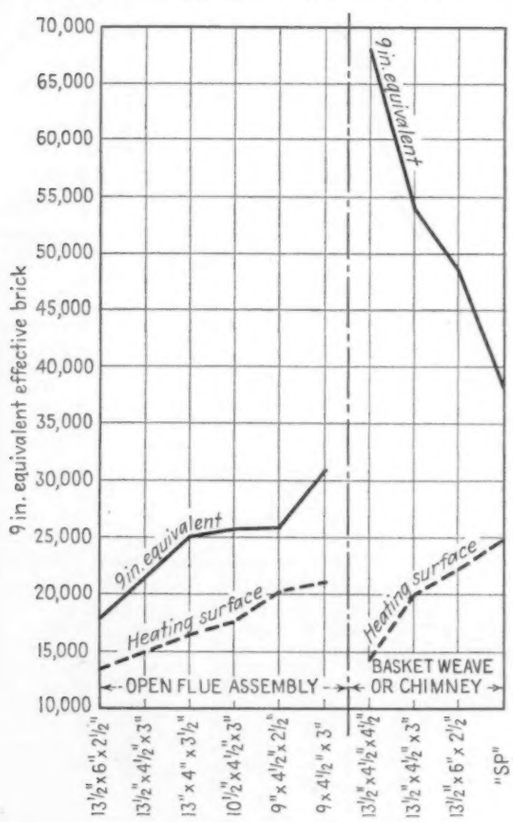
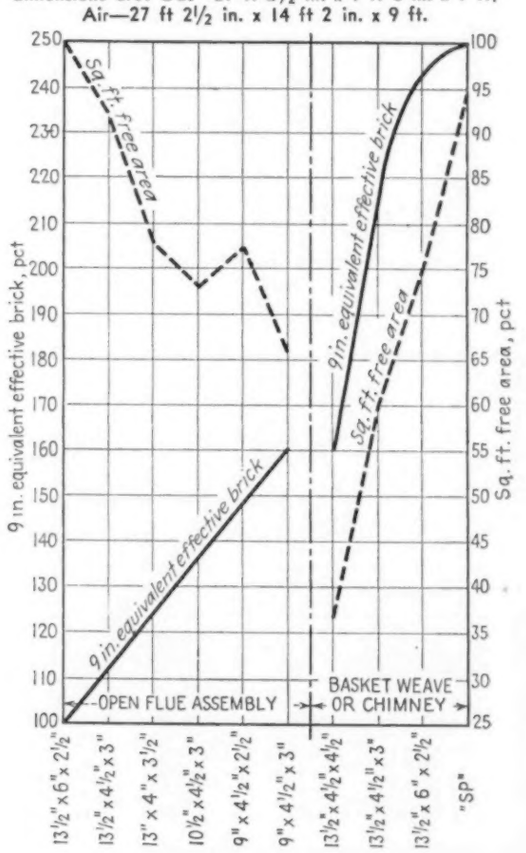


FIG. 10—Comparison of equivalent effective bricks and square feet free area for various checker sizes in the same size checker chamber. Assumed checker dimensions are: Gas—27 ft 2½ in. x 9 ft 8 in. x 9 ft; Air—27 ft 2½ in. x 14 ft 2 in. x 9 ft.



the 9 in. equivalent per cu ft of checker work is taken into account by multiplying this 9 in. equivalent by the percentage effective, the picture changes. This is shown in the last column of table I. The 9 in. equivalent effective brick per cu ft checkers gives, for the basket weave, 6.19 as against 3.04 for the open flue. In order to clarify the method used in arriving at the effectiveness, reference is made to figs. 6, 7 and 8.

By changing the bath volume in the furnace it has been possible to increase the melting capacity. Changing to a type of fuel which did not require the use of the gas chamber for preheating has permitted converting the gas chamber to the preheating of additional air to compensate for the increased fuel consumption. The next move would seem to be to increase the internal volume of the checker chambers themselves. This, however, has decided limitations. Few laymen appreciate the volume of water that is required to produce a ton of finished steel. This consideration has been the cause of locating most of the mills along streams or rivers where the necessary water is available. The floor under the rider walls in most checker chambers is now located on top of the water table. By installing flat arches in place of the sprung arches the height of the chamber has been increased somewhat, but there the limiting factor has been the underside of the charging floor. Building columns in most cases limit the increase in the horizontal area, leaving only one alternative, that of increased capacity or effectiveness of the checkers themselves. This increase in effectiveness should not be obtained by a sacrifice of the amount of free area now existing.

A number of melt shops have adopted a rectangular flue, fig. 4 being an example of this, and a number of installations have been made using different lengths of checkers laid up open flue. In comparing the capacities of the square flue with the rectangular flue, it is not possible to compare the square inch area of one with the other. Both flues must be converted over to comparative circular ducts having the same capacity and the same frictional loss. The formula for this conversion is:

$$De = 1.265 \left[\frac{(a\,b)^3}{a+b}\right]^{1/5}$$

where D is the diam of the circular flue and a and b are the dimensions of the rectangular flue.

The advantage to be gained from using the rectangular flue in place of the square flue is indicated in the following example:

A 6x6-in. flue has a circular equivalent of 0.238 sq ft.

A 4x10½-in. flue has a circular equivalent of 0.262 sq ft. This is equivalent to a 6.30x6.30-in. flue.

The periphery of the 6x6-in. flue is 24 in.

The periphery of the 4x10½-in. flue is 29 in., or an increase of 20 pct more surface.

If a 9x4½x3-in. checker is used to form a 6x6-in. flue, there will be 1.7 flues per sq ft horizontal area.

The 4x10½-in. flue can be constructed, giving two flues per sq ft.

It may not be possible, except at great expense, to increase the cubical volume of the checker chamber, but it is perfectly possible by changing the checkers and their assembly to obtain the same results as an increase in volume.

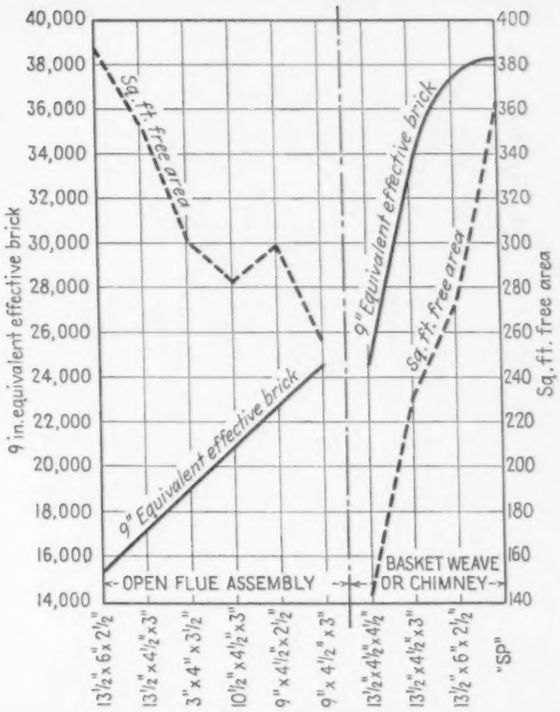


FIG. 11—Increase in relative effective checker volume and free area due to change in checker size and assembly. Assumed chamber dimensions are: Gas— 27 ft 2½ in. x 9 ft 8 in. x 9 ft; Air—27 ft 2½ in. x 14 ft 2 in. x 9 ft.

To illustrate this, reference is made to Table III and figs 9, 10 and 11. A checker chamber of the following dimensions has been assumed.

Gas, 27 ft 2½ in. x 9 ft 8 in. x 9 ft 0 in.
Air, 27 ft 2½ in. x 14 ft 2 in. x 9 ft 0 in.

This is an average of 15 actual chambers now in operation, with a furnace capacity ranging from 60 to 200 tons. In considering the question of the size of checkers or the method of assembly, there are two major considerations: (1) What change will occur in the square foot free area? and (2) What change can be expected in the 9-in. equivalent effective brick?

It will be noted from fig. 10 that with the open flue type of assembly an increase in the 9-in. equivalent effective brick carried with it a decrease in the free area. With the basket weave or chimney type of assembly, the reverse is the case.

Fig. 11 shows the calculations covered by table III converted into percentage, having taken a 13½x6x2½-in. checker open flue assembly 11x11-in. flue as 100 pct for the 9-in. equivalent effective brick and 100 pct for the free area.

In the foregoing discussion, the thought has not been to assist an engineering department in drawing plans for a new openhearth furnace, but, if possible, to help the operator who feels that a change in his present checkers, with respect to size and arrangement, might better his present operation.

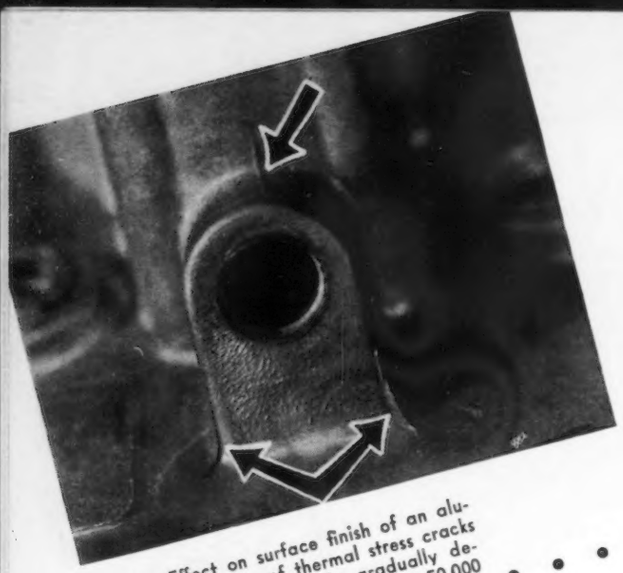


FIG. 1—Effect on surface finish of an aluminum diecasting of thermal stress cracks in the die. The die cracks gradually developed until they reached, after 50,000 shots, the degree shown here by the arrows.

Causes of Diecasting Irregularities

By JAMES L. ERICKSON
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The steadily expanding use of pressure diecastings has been accompanied by a constant improvement in casting techniques and better understanding of the cause of irregularities occurring in diecast parts. A concise but thorough explanation of the causes of some common diecasting irregularities is given in this article, together with suggestions for eliminating these defects. In this, the first part of a two-part article, the author covers normal characteristics of diecastings, the effects of pressure, temperature, and design, and describes irregularities affecting surface finish.

THE number of distinct types of irregularities which diecastings may manifest, and which when present are sufficient cause to reject the diecasting, is actually small. However, the number of different conditions which engender these irregularities is large. The following discussion has been prepared with a view to assisting the diecasting foremen formulate a better understanding of the nature of the myriad factors which abet the formation of these objectionable irregularities in diecastings; an understanding calculated to enable him to diecast parts free of such irregularities.

Quality diecastings have four major, desirable characteristics: (1) Excellent surface appearance and smoothness; (2) extreme precision; (3) excellent mechanical properties, and (4) homogeneous microstructure. The surface of a quality diecasting is clean, smooth, and sharp in outline and detail. A quality diecasting offers the designer the advantages of very close dimensioning, in the order of ± 0.001 in. per in., and a wide range of mechanical properties. Such castings also possess a very fine grained, homogeneous microstructure.

A few of the familiar irregularities encountered in connection with diecastings are: Trapped air porosity, evolved gas porosity, shrinkage porosity, cold shuts, shrinkage cracks, foam or sponge spots, sunken surface spots, inclusions, heterogeneous microstructure, surface flow lines (sometimes termed flowers), incomplete fill, etc.

Certain irregularities occur only in diecastings made from specific alloys, viz., aluminum, copper, magnesium, lead, or zinc-base alloys. Irregularities such as trapped air porosity, oxide inclusions, cracks caused by the generation of high internal stresses, cold shuts, shrinkage cavities, foam or sponge spots, and unclean surfaces are not peculiar to any single alloy group. Microshrinkage, pinhole porosity, iron inclusions, hot-shortness cracks, segregation, etc. are more specific to certain alloy groups.

Irregularities Affecting Surface Appearance

The principal reason quality diecastings have clean, smooth surfaces with sharp outlines and detail is that they are formed by the solidification of a molten alloy pressed tightly against a steel die cavity with highly polished walls. It follows therefore that any condition which (1) tends to decrease the polish or smoothness of the die cavity walls or surface, or (2) tends to cause the molten alloy to solidify before it is pressed firmly

o o o

FIG. 2—Typical cold shuts in an aluminum alloy diecasting. Top view (3X) also shows fine pinhole porosity. Center view (at 50X) illustrates the sharp demarcation along the border of a cold shut. Lower view (100X) of a cold shut shows the difference in microstructure on either side of the line of demarcation.

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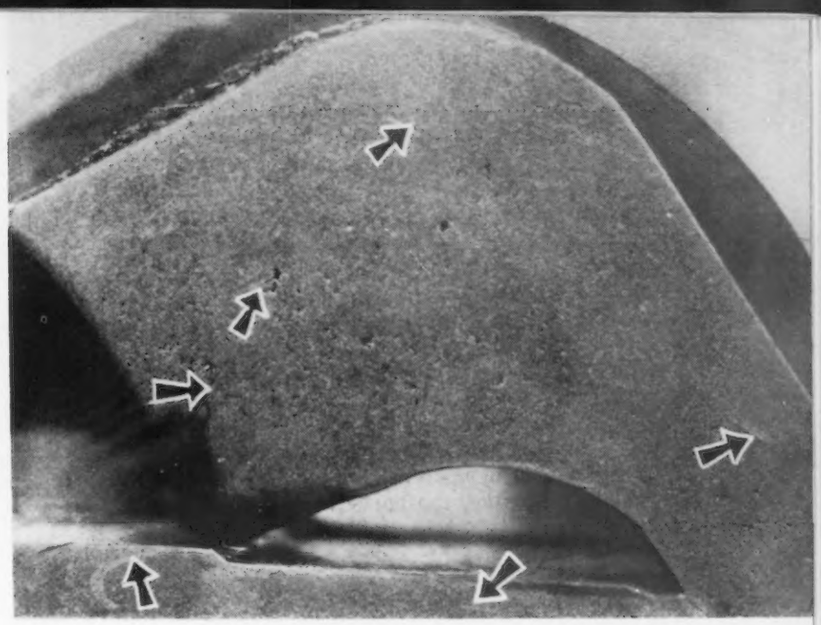
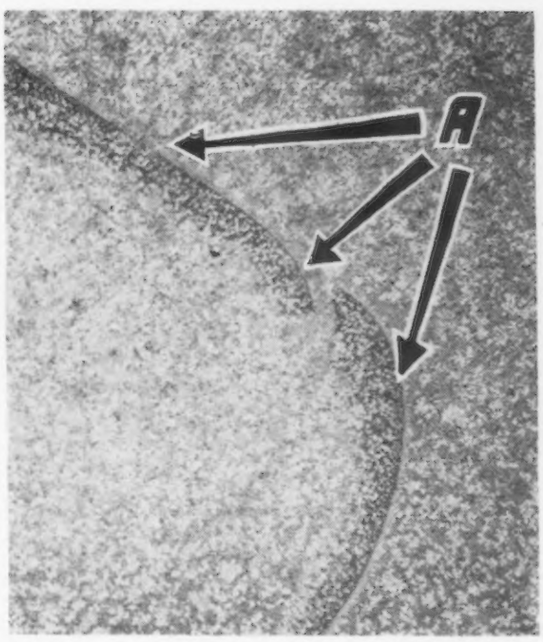


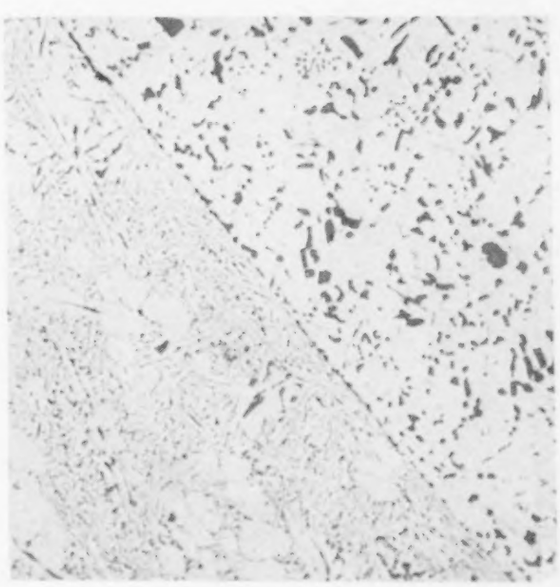
against the die cavity surface, or (3) tends to reduce the applied pressure on the molten alloy, or (4) tends to cause an agent, or tends to act as an agent, which comes between the die cavity surface and the molten alloy (an agent that prevents the molten alloy from closely contacting the die cavity surface) acts to decrease the degree of smoothness of the surface of a diecasting made when any or all of these factors are in effect.

Die Cavity Finish

Because of the extreme force with which the molten alloy is pressed against the die cavity surface, the surface of the alloy becomes an exact replica of this die cavity surface on solidifying. Any blemish in the finish of the die cavity surface is mirrored precisely in the surface of the diecasting made in such a die cavity. Thus, for example, tool marks on the die cavity surface, no matter how minute, are reproduced exactly on the surface of the diecasting. This is why it is extremely important that die makers and die maintenance men realize that in the cases where a good finish on a diecasting is specified, all tool marks must be completely polished out of the die cavity before diecastings are made therein. Indeed whenever maintenance or other routine work is done on the surface of a die cavity, such work must be executed with tools that will not mar the die cavity's surface-finish to the degree where the tool marks cannot be polished out without altering the dimensions of the die cavity. In the event that slight tool marks are unavoidable, they must be polished out before using the die in production.

Under certain conditions diecasting die steels heat-check,[1] viz., when the die steel is of the wrong variety, or when it is too hard, or when the melting point of the alloy being diecast is high (as in the case of the copper base diecasting alloys), or when the die cavity surface is exposed to molten alloy rays traveling at high velocities, or when the temperature differential between the die cavity surface and the underlying layers is too large, or when the die cavity has been improperly designed with respect to thermal stresses

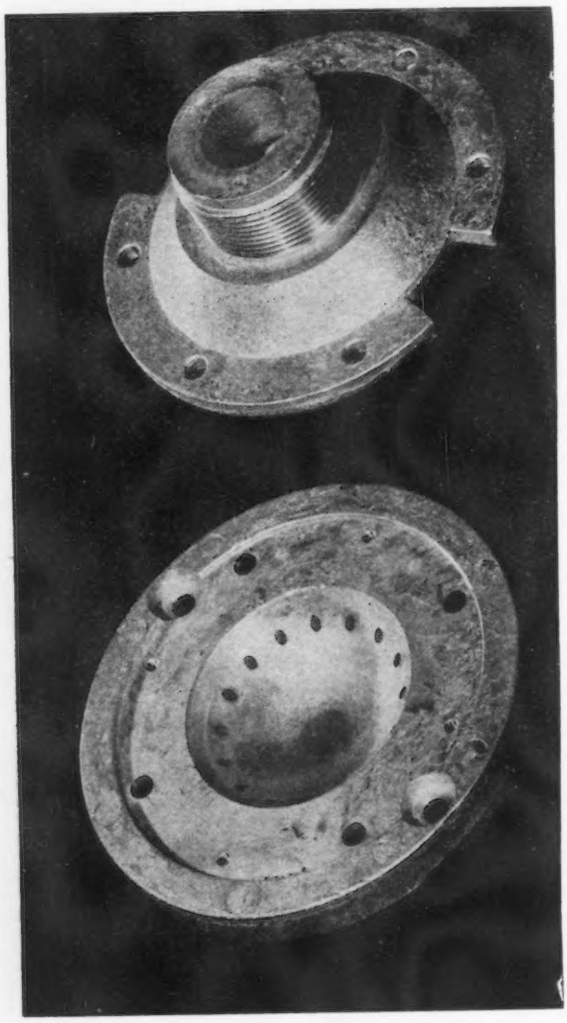




created in it during casting, etc. Heat-checks begin first as very tiny fatigue cracks and increase in size as the number of diecastings made in the die cavity increase. The presence of these heat-checks on a die cavity surface is mirrored on the surface of the diecastings made therein as a network of fine, raised fins, which reduce the smoothness of the casting's surface. Therefore, as soon as heat checking sets in, the die cavity surface must either be vapor-blasted or polished with rouge. While these procedures will not prevent further heat checking of the die cavity surface, they will temporarily afford relief from the production of diecastings with inferior surfaces. In the case of copper base alloy diecastings that have to be plated, the periodic vapor blasting of the die cavity's surface will substantially reduce the necessary polishing operations which have to be performed on these diecastings before they can be plated.

In addition to becoming heat-checked, a die cavity surface may become pitted. This condition is due to either the attack on the die steel by the molten diecasting alloy, or by an acid-containing die coat, or by an acid containing die lubricant. The fact that a microconstituent of a die steel may be chemically attacked by a constituent of the molten casting alloy, or by an acid die coat, or even by an acid die lubricant must be born in mind at all times by the diecaster. Any chemical action which eats away the die cavity surface in broad but localized areas necessarily causes an increase in the wall thickness (in most cases only microscopic, but nonetheless important) of the castings and at the same time decreases the quality of the casting's surface-finish.

FIG. 3—Two zinc alloy diecastings showing typical flow-lines on the surface.



The chemical attack by either a molten diecasting alloy, a die coat or a die lubricant, and/or the chemical deposition of a chemical element or compound by a molten diecasting alloy, may result in an undesirable buildup on the die cavity surface, which has the effect of roughening this surface and thus adversely affecting the casting's surface-finish. One excellent example of the deposition of a compound by a diecasting alloy is the deposition of a zinc oxide layer by zinc-containing copper base alloys.

Occasionally a die steel is found which is itself unclean and even though it may be given a high polish it will still manifest tiny pits in its surface which further polishing will not remove. Later these pits are mirrored on the casting's surface as tiny hills or tiny raised mounds. Occasionally imperfections in the steel itself evidence themselves as raised hard spots which polishing fails to remove. These in turn are mirrored in the surface of the diecasting as tiny depressions.

Irregularities which manifest themselves as raised impressions on a diecasting's surface can be polished out before plating, but of course their presence necessitates polishing and increased costs.

The surface-finish of a diecasting may also be spoiled by the presence of tiny undercuts in cores which produce drag marks on the surface of cored holes when the casting is ejected from the die cavity. It goes without saying that cores must therefore always be kept free of undercuts if a smooth surfaced diecasting is to be supplied the customer. Nitriding and case hardening the cores are frequently and successfully resorted to when a good surface finish is required in cored holes.

Single large die cracks may also decrease surface finish on diecastings. Such cracks are most frequently found at locations within the diecasting die where severe thermal stresses are present, as shown in fig. 1.

Failure of Applied Pressure

Some of the most common surface irregularities such as flow lines, deep seam lines, cold shuts, metal overlappings and metal sprinklings are traceable to the fact that the molten metal injected into the die cavity solidifies before the applied pressure is able to press it tightly against the die cavity surface.[2]

Pressure applied to the molten metal forces the molten alloy into the diecasting die cavity through a small orifice, or gate. The magnitude of the applied pressure, as well as the size and shape of the gate, determines, in part, the time required to fill the die cavity completely with molten alloy. When both the size of the gate and the magnitude of the applied pressure are small, the

rate of fill is small, and when the rate of fill is small and the volume of the die cavity large, the molten alloy forced into the die cavity tends to solidify within the cavity before the applied pressure is able to press this alloy tightly against the surface of the cavity and/or before the alloy has even partly filled the die cavity.

A cold shut (or shot or shunt as it is variously misspelled and defined) is perhaps the least popularized of all of the undesirable irregularities to which a diecasting may be host, for as yet no thoroughly successful nondestructive technique has been devised for detecting its presence. Claims of its detection by radiography are not well substantiated.

A cold shut is a discontinuity in the internal structure of the diecast metal in the form of a plane, oriented at random, whose surface is made up of metal which has solidified earlier than the metal it abuts. Often this surface has an oxide film. A cold shut is a break in the continuity of the cast metal, as illustrated in fig. 2. This break is a point of weakness in the casting as it ruptures readily when subjected to mild stresses applied normally to the plane in which it lies.[3]

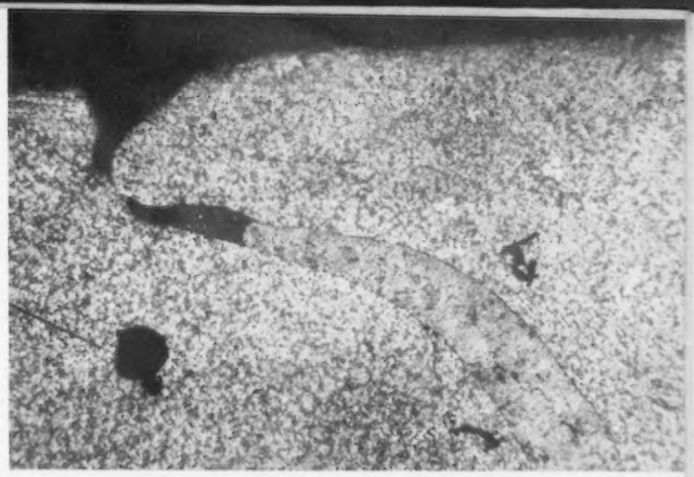
Cold shuts can largely be avoided by simply getting the molten alloy into the die cavity before it begins to solidify. Increased rate of fill may be accomplished by increasing the applied pressure, increasing the cross-sectional area of the gate, decreasing pressure losses due to runner friction, increasing the temperature of the die and/or the diecasting alloy, and by employing overflow so as to relocate the points at which incoming molten alloy rays join one another.

Flow-lines (flowers) are harmless irregularities, and in this respect they differ from either cold shuts or deep-seam-lines. While deep-seam-lines penetrate far into the interior of the diecasting, flow-lines (fig. 3) penetrate only the outer surface of the diecasting by a few hundred thousandths of an inch. Flow-lines occur whenever there is insufficient applied pressure to literally press them out.

Deep-seam-lines are formed by turbulence in a semimolten alloy and molten alloy incoming rays and are the surface areas where the incoming molten metal rays, or ray portions, just haven't fused together. Typical deep-seam-lines are shown in fig. 4. Deep-seam-lines are easily visible to the naked eye, as opposed to cold shuts. Cold shuts are, however, generally most abundant in or near the areas of deep-seam-lines. Deep-seam-lines frequently result from a lack of an applied pressure of sufficient magnitude to overcome the adverse effects of turbulence on molten or semimolten alloy.

Too Rapid Solidification

Overly quick solidification of the molten alloy injected into a die cavity can also engender flow-lines and deep-seam-lines. Here molten alloy injected into the die cavity solidifies before the applied pressure has a chance to press out these two types of surface irregularities. Premature solidification may occur as a result of the casting alloy being too cold, i.e., the alloy doesn't remain molten for a sufficient interval of time. This is most frequently the case with the molten alloy



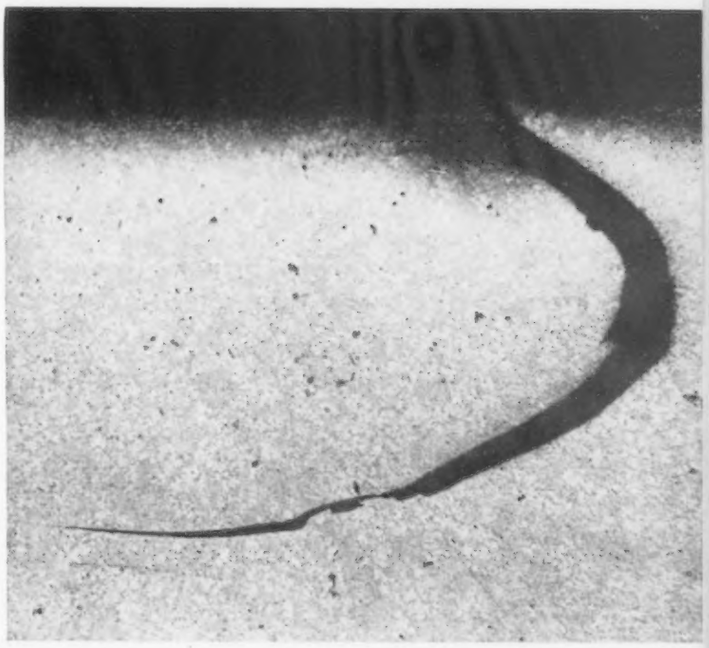


FIG. 4—A deep-seam-line is shown in the top view (40X) filled with metal forced into the seam-line by pressure applied after the region of the seam had solidified. Lower view (100X) shows a deep-seam-line that begins at the casting's surface and extends 0.022 in. into the interior. Notice that the microstructure of the alloy is identical on each side of the deep-seam-line as opposed to a cold shut.

which first contacts the die cavity surface, since this portion of the incoming molten alloy is subject to a great thermal shock which tends to solidify it rapidly. If the first layer of alloy to solidify adjacent to the die cavity surface is of considerable depth, and therefore mass, subsequent alloy surrounding it does not fuse properly with it, or melt it, and even high pressures cannot iron out the flow or seam-lines.

Premature solidification of the casting alloy in the die cavity results when the die is too cold, or when the die has been improperly designed or improperly water cooled, or when the diecasting design itself is inferior, or when the casting alloy itself is too cold.

Anything which tends to prevent the intimate contact of the highly polished die cavity surface and the molten alloy will affect the nature of the surface finish of a diecasting. Such things as air, water vapor, die coating, die lubricant, oxide film on the die surface, oxide film on the molten

FIG. 5—The amount of die lubricant used affects the flow of the incoming molten metal stream, and in turn has an influence on the surface of the casting. The panels are of R alloy. Photo courtesy Dow Chemical Co.

metal surface, inclusions, shrinkage cavities below the surface of the metal in contact with the die surface, vacuum cavities below the surface of the metal in contact with the die surface, and high casting alloy surface tension act to prevent the proper molten alloy-die surface contact. Irregularities, which may be engendered by the presence of one or more of the agents or conditions mentioned, are extremely varied, viz., flow-lines, deep-seam-lines, spongy or foam spots, shrinkage cracks, caved-in-spots, discolored areas, pitted surfaces, blotched areas, hard-spots, surface depressions, cold-shuts, wall thickness variations, etc.

Flow-Lines — These irregularities, described earlier, are frequently caused by the presence of an agent, for example a gassy film, lying between the molten metal and the die surface, which acts as a buffer and prevents the applied pressure from completely pressing the molten alloy against the die surface and thereby smoothing it out. Fig. 5 illustrates flow-lines attributable to die lubricant. A gassy film may arise in one of several ways: It may form as the result of the vaporization of the water of crystallization present in a die coating or from the vaporization of an oil present in a die coat or lubricant. It is wise for the diecaster to avoid, if at all possible, the use of die coats, sprays, lubricants, etc., when diecasting. While a die coat may have a definite place in permanent mold casting as an insulating agent, die coats have no place in diecasting as such. Diecasters should never rely on an insulating compound to govern the rate of chill, but rather on proper gating, venting, temperatures, pressures, and design to eliminate the undesirable irregularities engendered because of too steep a thermal gradient.

Deep-Seam-Lines—What has been stated about the formation and correction of flow-lines also applies to deep-seam-lines. There is this in addition however, that deep-seam-lines, surface spirals and the like, are often caused by the presence of a trapped gas, as shown in fig. 6. In the event that trapped gas and turbulence are the cause of deep-seam-lines, etc., the deep-seam-lines may be eliminated by the careful use of overflows into which the trapped gas can be washed, or by additional and more adequate venting, or by the relocation of the gate, or even by the redesign of the die cavity itself to avert the entrapment of air.

Sponge or Foam Spots — Occasionally spots occur on the surface of diecastings which are transversed by numerous, extremely delicate channels and pores. One form of these spots, commonly referred to as sponge spots, is not easily detected even by radiography but its presence is readily discovered in a ruptured cross-section. The foam spot appears as a difference in the shading between the sponge area and the sound, dense areas. The presence of foam spots frequently is traceable to the presence of oxide inclusions in the molten alloy used to make the diecastings, viz., wet oxide or dross. Spongy spots are actually areas of tiny gas pockets. The most frequent cause of spongy spots is the formation of a highly gassy area at a point where the molten alloy has come in contact with a die lubricant or die coat and vaporized it into a large volume of gas that honeycombs the alloy as it solidifies. Spongy spots are very harmful defects and their presence greatly reduces the impact strength of the diecastings in which they occur.

In addition to seriously reducing the casting's impact strength, spongy spots tend to seriously decrease corrosion resistance. This is especially true in the case of the aluminum base alloys which contain a high percentage of copper. The presence of spongy spots in aluminum base diecastings increases the chance that such diecastings will actually harbor a corrosive agent in the form of an electrolyte which has been taken into the spongy area during the cleaning of the casting, or even that it will harbor condensed water vapor from the atmosphere. Spongy spots occasionally occur even on zinc base diecastings. Here they are equally as dangerous, especially when the diecastings having these spots are electrolytically cleaned, electroplated, or given a chemical surface treatment—in which case the solutions employed in such treatments stand a

chance of being retained in the spongy spot area even after the rest of the casting's surface has been thoroughly cleaned, dried, or plated. The presence of spongy areas also seriously hampers the plater.

When spongy spots are found on diecastings, steps should be taken by the diecaster to immediately eliminate their occurrence. And above all, diecastings having spongy areas should never be welded.

Shrinkage Cracks and Caved-In Spots—Certain types of shrinkage cracks are engendered by the presence of an insulating agent such as an improperly applied die lubricant or die coating, which acts to prevent the intimate contact of the molten alloy and the die surface thereby preventing adequate heat transference. The presence of such an agent has the effect of upsetting the thermo-balance of the die cavity's surface-molten metal system. This causes one portion of the molten alloy in the die cavity to lose heat less rapidly to the die cavity wall that is insulated than it loses heat to the opposite die cavity wall. This condition results in a condition where that portion of the alloy solidifying first, that is the portion next to the uninsulated die surface, draws molten alloy away from the area which cools less rapidly. Such a withdrawal of molten alloy may create a vacuum cavity below the surface of the diecasting at the point where the insulating agent has decreased the rate of heat transference, or cooling. The presence of such a vacuum cavity has a tendency to collapse the wall of the diecasting when it is removed from the die cavity, if the metal bridging the vacuum cavity is not of sufficient strength to withstand the atmospheric pressure. This is particularly true of alloys having a low tensile strength at elevated temperatures.

FIG. 6—Surface appearance of deep-seam-lines at full size.

Discolored Areas—The presence of an undesirable agent between the die cavity surface and the molten alloy may lead to the permanent discoloration of the surface of the diecasting. Discolored areas occur when the agent contains a carbonaceous material or when the agent reacts with the molten alloy surface to produce a carbonaceous residue. Die coats and lubricants containing either graphite or a constituent which breaks down under the action of heat to give a carbon residue tend to discolor the surface of the diecastings, and the use of these agents should be rigorously avoided. Die coats should be avoided and their need supplanted by the employment of new gating, new venting, or different temperatures, pressures, or die design so as to avoid this irregularity.

Rough Surfaces—Rough surfaced diecastings may be caused by the presence on the die cavity surface of a hard film or deposit formed as a result of the vaporization and oxidation of one of the constituents in the diecasting alloy which in turn is deposited on the die cavity surface. Such film deposits on the die cavity surface may also be formed by the breakdown of organic die coating materials. These films and deposits cause the diecasting die surface to become roughened, and this roughness is, of course, in turn reflected on the surface of the diecasting made in this die cavity. Diecastings with rough surfaces engendered in this manner have to be more extensively polished before plating than if they had smooth surfaces.

Pressure, Temperature and Design

The attainment of a diecasting with a quality finish is very much dependent upon the prevailing alloy and die temperatures, the magnitude of the prevailing pressure and the duration of its application, the design of the die cavity, and the design of the diecasting itself.

Whenever the molten alloy does come in inti-

(CONTINUED ON PAGE 151)

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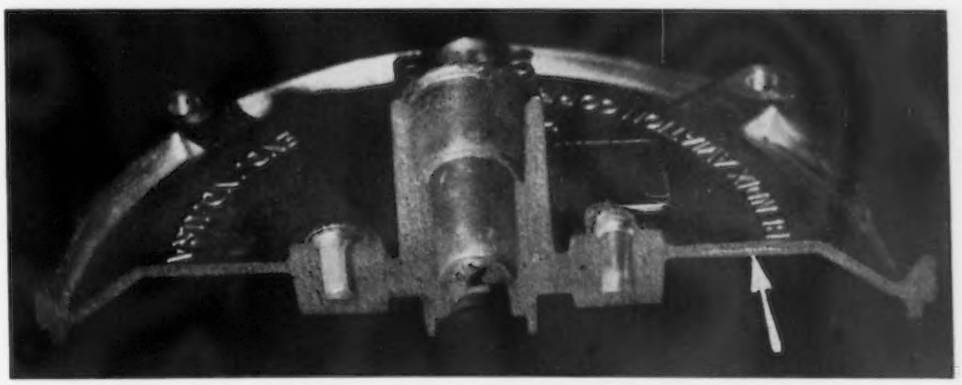

FIG. 7—Cross-section of an aluminum alloy diecasting (quarter size) showing an internal blister.

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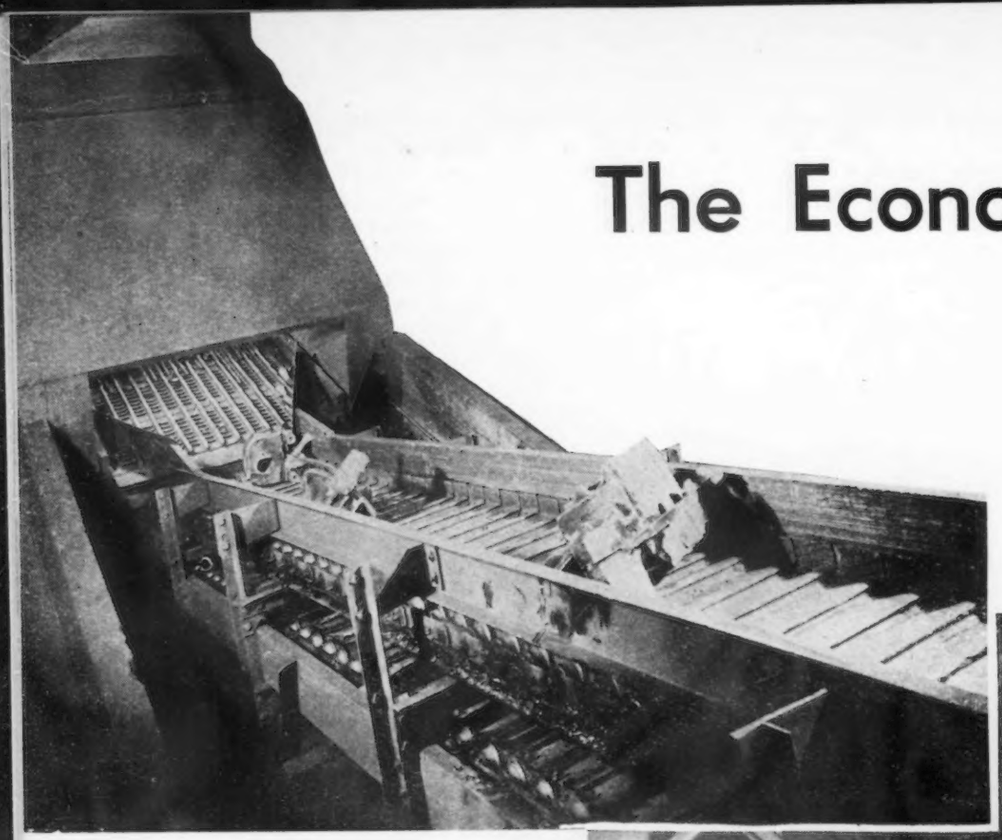
The Economics of

By JAMES L. YATES
Consulting Engineer, National Engineering Co., Chicago



ABOVE

FIG. 1—A modern mechanical shakeout installation for handling malleable castings.

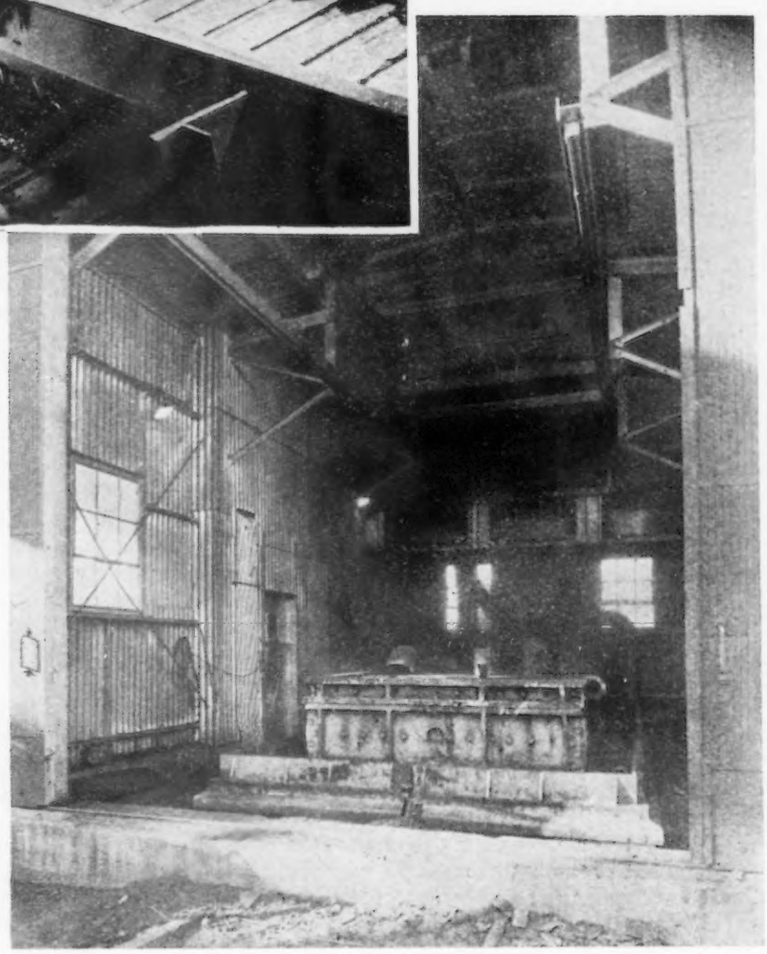


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FIG. 2—This National Engineering Co. mechanical shakeout installation, believed to be the largest such installation in the world, handles iron castings for compressors and diesel engines.

IN past years foundry shakeout operations have been the most disagreeable job in the foundry because they were usually hot, very laborious, and invariably accompanied by an atmosphere thick with dust.

Many factors have combined to force improvements in shakeout methods. While the modern mechanical shakeout is the device that catches the eye because of its remarkable performance, it is only one link in a chain which must be considered in its entirety if one expects to weigh the overall results of mechanized operations.

Some of the links in this chain are circumstances; others are mechanical devices, and some intangibles which are hard to measure, but which nevertheless have a very direct bearing when viewed from the economic standpoint.

[1] *A comprehensive discussion of methods, benefits and costs of dust control efforts in the foundry was presented in the article "The Foundry Atmosphere," THE IRON AGE, Aug. 21 and Aug. 28, 1947.—Ed.*

Analyzing the circumstances first, it is found that the day is passing when foundrymen will work in the thick foundry atmospheres[1] of yesteryear. Labor demands a more pleasant

Mechanical Shakeout • • •

place to work and it migrates from those shops that have not cleaned up their operations.

Today's labor market with its high rates for relatively unskilled labor makes it necessary that each and every operation be as economical of manhours as possible. The stringent requirements of many states in the matter of health and safety are such that it is rapidly becoming a case of clean up or get out of the foundry business.

Each foundry is a problem in itself because there are seldom two alike, and when one finds two that are similar in equipment, they are usually radically different in mode of operation.

Mechanical shakeout, if effectively applied, offers important opportunities to foundry management for reducing production costs and improving working conditions. It also makes possible increased output with the same floor area. This article explores the many aspects of mechanical shakeout and cites specific operating data covering a variety of sizes and types of flasks.

However, there are several basic fundamentals that affect all foundries and have a direct bearing on operation in general, and on the economics of mechanical shakeout in particular. Some of the most important fundamentals are discussed here.

The use of mechanical shakeout usually can be justified by the requirement of state codes as regards dust and fume control; experience tends to show that dust can best be controlled when it is picked up at the point where made, or as near thereto as possible—mechanical shakeout invariably makes this feasible; mechanical shakeout is faster in general than any other known means; mechanical shakeout requires relatively less labor for a given job and makes for an easier task, and mechanical shakeout causes less wear and tear on flasks and allied equipment than any other method of shakeout.

A flask shaken out on a mechanical shakeout

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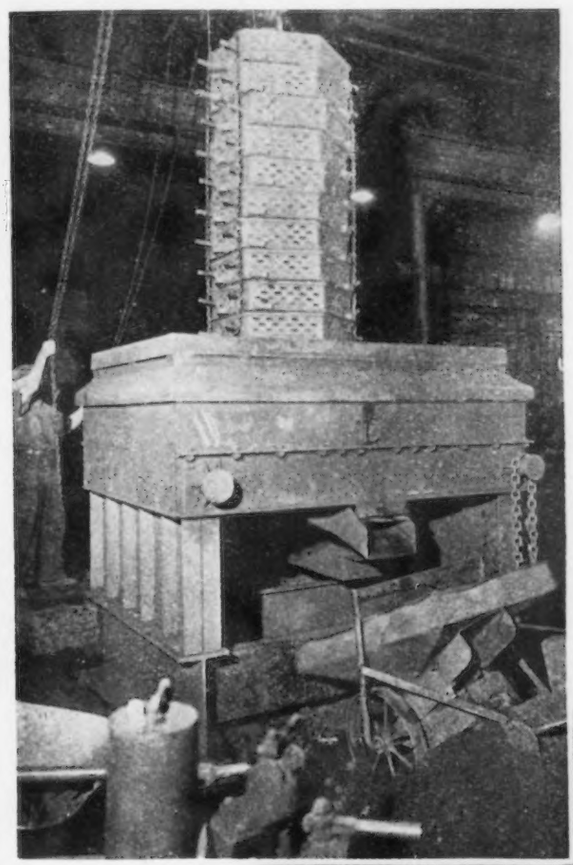

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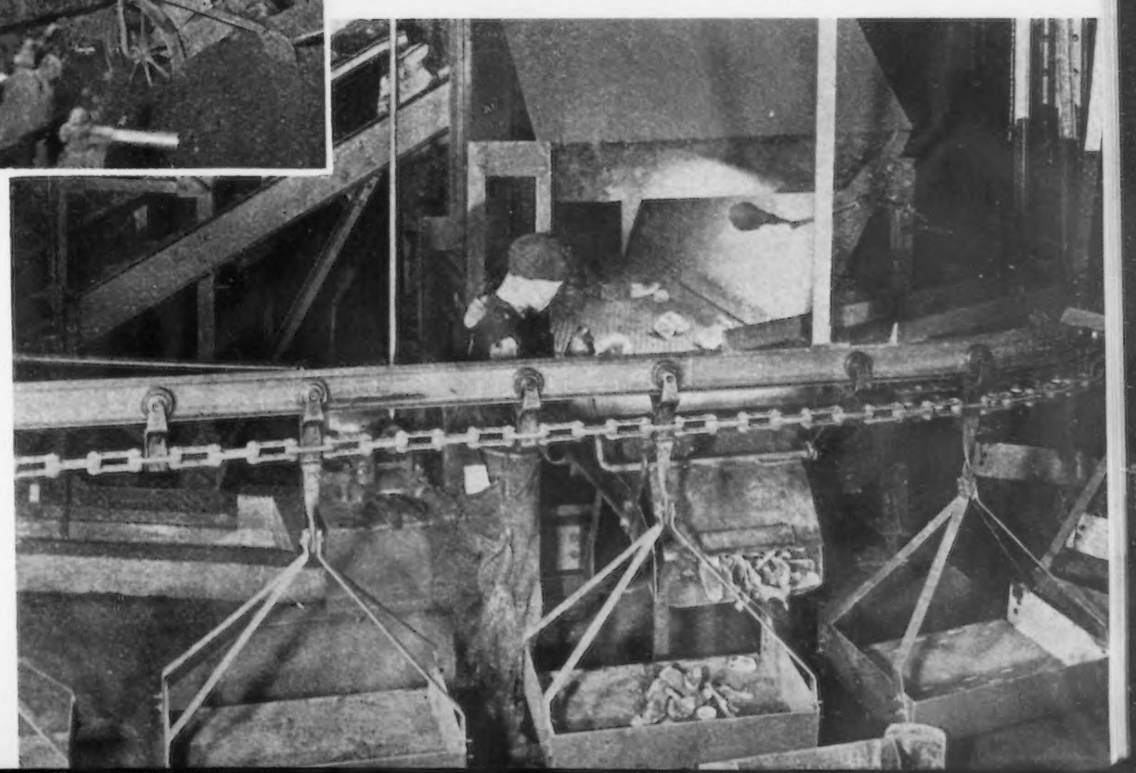
ABOVE

FIG. 3—A portable shakeout unit manufactured by Robins Conveyers, Inc., handling 10 truck flywheel castings. In this job the sand falls into a chute where it is wet down and from there runs into the conditioner.

o o o

BELOW

FIG. 4—Mechanical shakeout feeding textile machinery castings directly into a conveyer.



is usually clear of the iron oxide which forms continually and which has to be chipped out or scraped off if allowed to accumulate, especially on flasks used in making large (10 to 25 ton) castings. Shakeout by mechanical shakeout is such that it creates other problems which when solved add further to the economy of general foundry operation.

The successful use of mechanical shakeout entails a number of problems which have a bearing on the overall economic problem of foundry operation. Experience proves that if air is exhausted from a building in an effort to control dust, a like amount of air must be fed into the building in such a way as to not cause discomfort of the workers or the upsetting of dust control devices by the creation of drafts and air currents within the building itself. In locations where winter heating is required, this poses quite a problem and has a definite bearing on the coal pile.

Mechanical shakeout is so rapid, that is, the sand and casting are parted so quickly that special attention must be paid to means of serving the shakeout with flasks at a rate sufficient to take complete advantage of this accelerated operation.

The sand from shakeout accumulates so rapidly that special provisions must be made to take it away just about as fast as it is shaken out. Usually surge hoppers are placed under the shakeouts in order to keep conveyor sizes to a minimum and to allow for the tremendous rate of sand flow at the moment when the sand breaks, that is, starts to leave the flask. If the shakeouts are part of a continuous system where the sand is used over and over, a surge bin is necessary to allow for surges in the rate of sand return because the mechanical shakeout operation can usually outstep the molding operation. If the shakeouts are part of a jobbing type of foundry with periodic shakeout intervals, then storage must be provided for the sand.

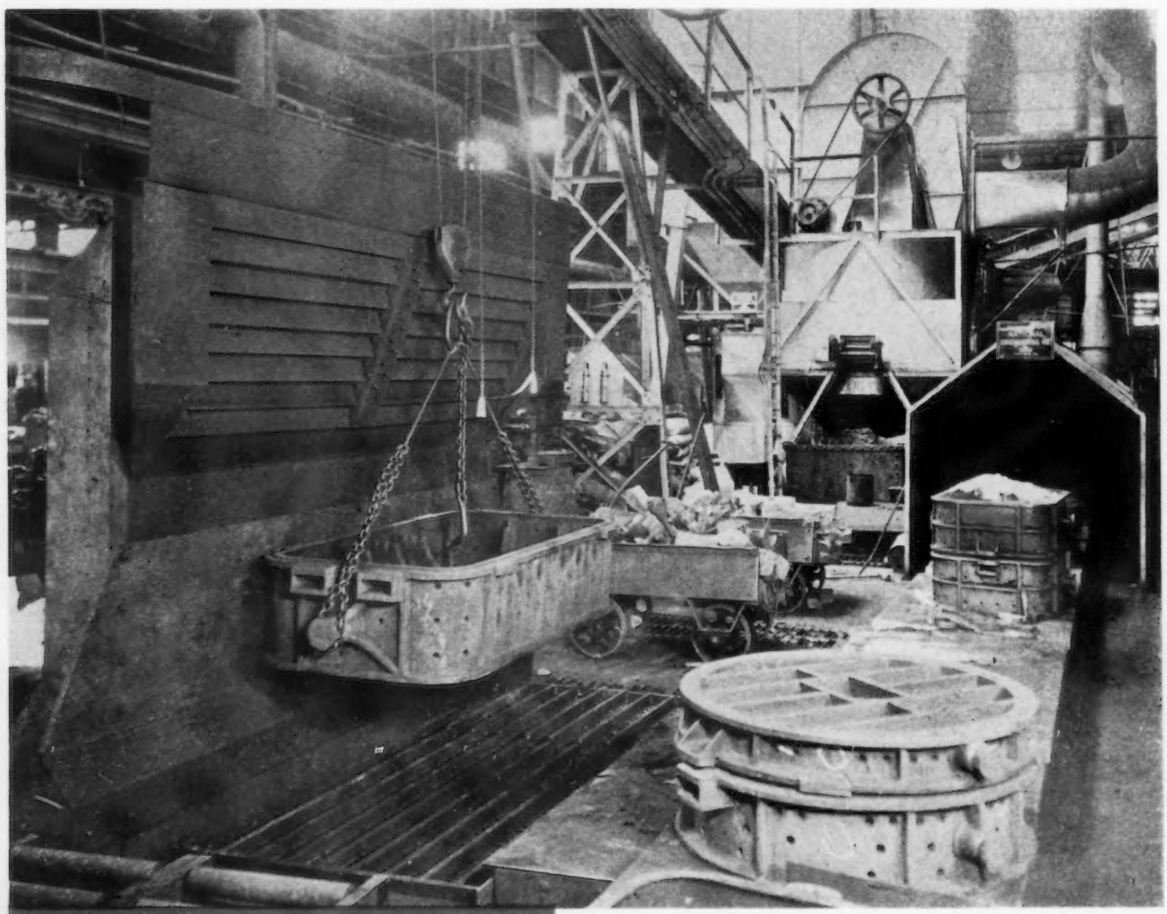


FIG. 5—Medium-sized unit for the shakeout of agricultural implement parts.

All shakeouts generate dust in large quantities and require adequate exhaust provisions to control it. Use of mechanical shakeout with proper dust control usually focuses attention on dusty areas which, before the advent of mechanical shakeout, were clean by comparison.

Types of Equipment Available

The equipment for mechanical shakeout is available in a wide range of types and sizes, some portable, some stationary as regards location, some requiring foundations and some which can be pushed about the foundry on wheels. Some types are self-feeding and self-unloading. In fact, a mechanical shakeout and the auxiliary

apparatus necessary to make a successful installation are available to meet almost any shakeout problem. The photographs accompanying this article illustrate some of the various types of mechanical shakeout equipment in use.

The intangible factors forcing modernization of shakeout methods are difficult to establish but some of them are noted herewith. The saving of gaggers and rods and, in many instances, core arbors, is a notable factor. This saving may range from a few pounds of rods per day to as high as a carload of rods per month. When labor for cutting and bending is added, this amounts to a tidy sum. Improved control of dust definitely cuts down the number of eye accidents and improves insurance rates. Less dust in the foundry atmosphere means less dirt on window panes, on light bulbs and reflectors, cleaner foundry walls and less clean-up time in all parts of the foundry.

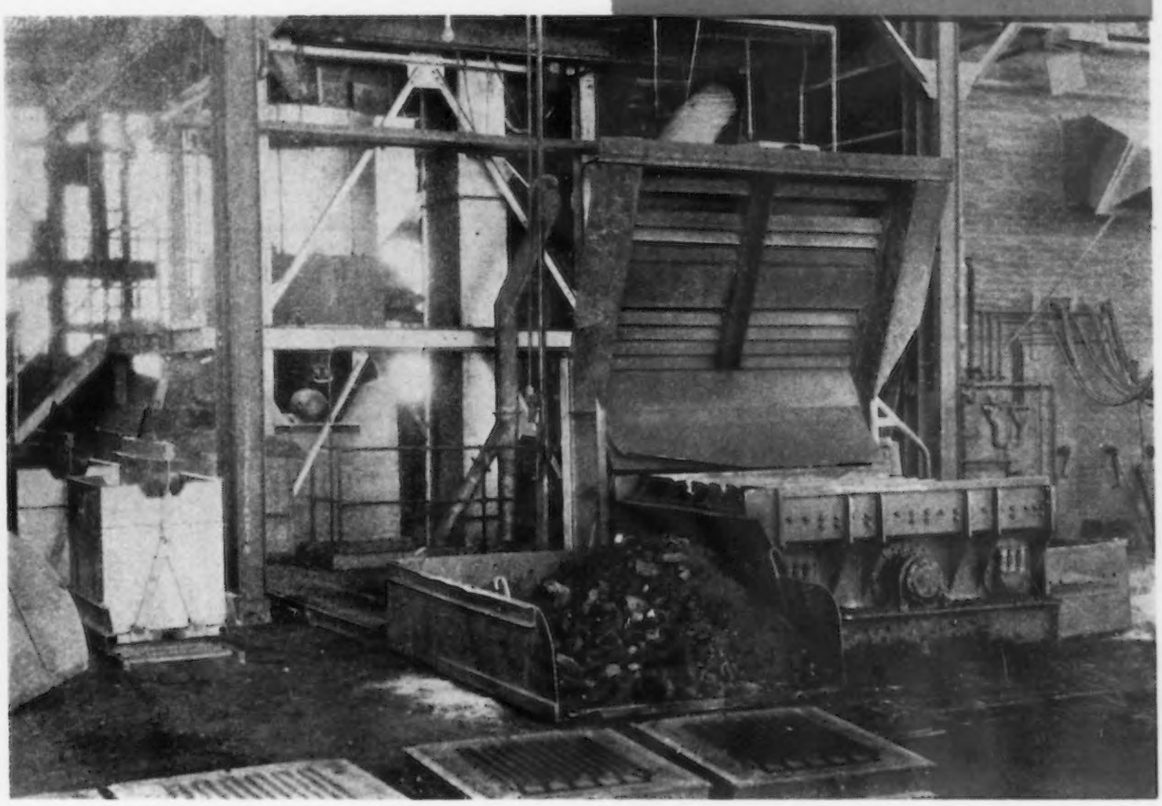
Decreased wear and tear on flasks and almost complete elimination of flask breakage due to shakeout is also an important consideration, as well as improved working atmosphere which tends to attract a better class of labor and allows greater production for the same overall effort because fatigue progresses at a lower rate.

Initial costs vary with each installation and vary widely. Some layouts contemplate mechanical shakeout in the original conception and under these circumstances can be installed with a minimum of cost. This situation pertains when a complete new foundry is being planned or when a new unit is installed in an existing foundry. Modern foundries are usually laid out for mechanical handling of sand from the incoming cars to the refuse dump. At the time these are being laid out it is a comparatively easy task to add mechanical shakeout and mechanical core knock. The cost of the mechanical shakeout when designed as part of a mechanical sand handling system is at a minimum.

In the small foundry, where work is poured on the floor and where sand is cut on the floor, the portable shakeout on wheels or on legs for movement by overhead crane often works well and makes for a maximum of saving with a minimum investment.

In the jobbing shop making many sizes of castings, the problem is more complex. Here it is often best to install a multiplicity of shakeouts one each for the various classes of work, depending on size and weight of castings.

FIG. 6—Medium-sized shakeout for handling steel alloy castings.



Delving into the records of one of the more modern jobbing shop type of foundries a variety of shakeout arrangements can be found, each with the same final answer; the cost of shakeout per flask is reduced over any previous methods; the wear and tear on men and on the flask equipment is reduced and production is generally increased.

This particular foundry has an incentive system and this makes possible the study of savings irrespective of the wage structure and therefore gives comparisons that can be applied directly to any similar operation. Starting with a bench molding department equipped with jolt squeezers

TABLE I

Comparison of Hand v. Mechanical Shakeout of Green Sand Work

Flask Size	Total Standards		Pct Reduction	Pct Increased Production
	Old Method	New Method		
37 in. diam x 24 in. deep	31.0	26.0	16.0	19.0
x 30 in. deep	35.0	26.0	26.0	35.0
x 36 in. deep	39.0	27.0	32.0	44.0
x 42 in. deep	42.0	27.0	36.0	56.0
x 48 in. deep	46.0	31.0	33.0	48.0
48 in. diam x 24 in. deep	41.0	26.0	37.0	58.0
x 30 in. deep	47.0	26.0	45.0	81.0
x 36 in. deep	54.0	29.0	46.0	86.0
60 in. diam x 20 in. deep	50.0	27.0	46.0	85.0
40 in. x 60 in. x 16 in. deep	39.0	30.0	23.0	30.0
x 22 in. deep	47.0	33.0	30.0	42.0

and overhead sand, using flasks 12x16x12 in., 14x18x12 in. and 16x16x12 in., the molds are set out on roller conveyers for pouring and are shaken out on a 36x42 in. mechanical shakeout. An average standard per mold of 3.3 is reported, as against 7.5 by the old method. Production was increased 127 pct. The increase in production from the same number of molding machines and molders is not all due to mechanical shakeout. But to use mechanical shakeout to maximum advantage a general rearrangement of the equipment was carried out whereby the molding machines were grouped together and provided with overhead sand; roller conveyers were used in place of setting out molds on the floor; the molders now mold all day instead of pouring off their own production with the help of the chipping gang. All the pouring is done on the roller conveyer and the molds are rolled off onto the shakeout with the castings being hooked off into tote boxes. The flasks and bottom boards return to the molders via inclined roller conveyer and the sand drops through the shakeout into a large box for return to the sand mixer for remixing.

The shakeout itself reduced the standard (normal time to do the job referred back to units) from 7.5 to 3.3 or a reduction of 56 pct. The combination of rearrangement of equipment, including shakeout, increased production from the same molding machines and the same floor space 127 pct and did it with less manhours than were formerly required for less than half the production. In addition it made it possible for this portion of that foundry to meet the requirements of a rather stringent State Industrial Hygiene Code as applied to foundries.

Taking a green sand side floor using jolt, roll-over, pattern draw machine, overhead head sand, and flasks as listed in table I, reductions in standards are indicated ranging from 16 to 46 pct, and increases in production, varying with the class of work going through, ranging from 19 to 86 pct. Table I shows the greatest reduction in the standard on the deepest flasks, those that were the most troublesome with the old air vibrator and sledge hammer method of shakeout. Some of these flasks are barred and all of these have a great many gaggers to keep the green sand from dropping. This floor has its own sand preparing plant and sand from shakeout returns to used sand storage mechanically. It returns to the molders' hoppers by overhead conveyer after going through the sand preparing plant. The space occupied by the mechanical shakeout, sand storage and sandhandling equipment was originally molding floor but the generally cleaner atmosphere, ease of shakeout, cleanliness of flasks returned to the molders and other intangibles tend to reduce the time required for a given mold, to the point where more molds are produced even in the reduced working area. All shakeout on this floor is now a daytime operation as against a night crew with the old sledge hammer methods.

TABLE II

Comparison of Hand v. Mechanical Shakeout of Dry Sand Molds

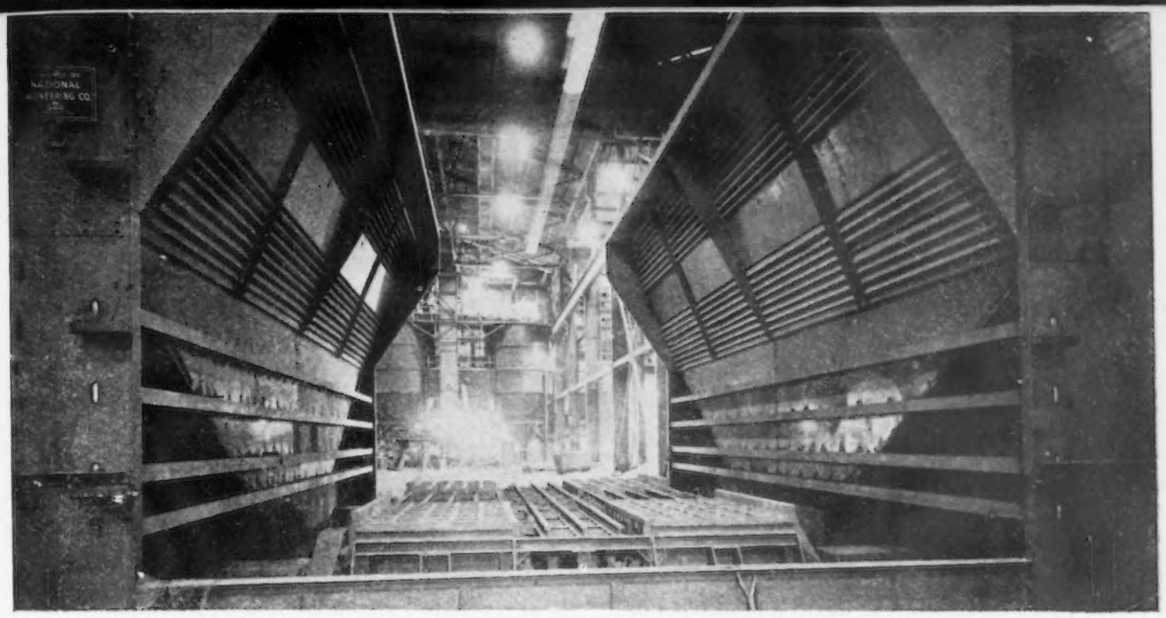
Heat	Total Standards		Pct Reduction	Pct Increased Production
	Old Method	New Method		
A	3,060.0	2,543.0	16.9	20.4
B	2,580.0	1,923.0	25.5	34.2
C	2,960.0	2,133.0	27.8	38.5
D	2,559.0	1,875.0	26.7	36.5
E	3,142.0	2,274.0	27.6	38.2
Total	14,301.0	10,751.0	Avg 24.9	Avg 33.6

TABLE III

Comparison of Hand v. Mechanical Shakeout of Large Dry Sand Molds

Flask Size, in.	Total Standards		Pct Reduction	Pct Increased Production
	Old Method	New Method		
92x276x70 deep	997.0	313.0	68.7	218.4
92x276x50 deep	642.0	383.0	40.4	67.4
86x228x76 deep	731.0	410.0	43.9	78.3
56x156x46 deep	238.0	172.0	27.8	38.4
60x135x45 deep	221.0	168.0	24.0	31.6
72x 90x60 deep	284.0	113.0	60.2	151.2
108 diam x 27 deep	206.0	138 0	33.0	49.3
84 diam x 32 deep	140.0	90.0	35.7	55.6
72 diam x 32 deep	121.0	88.0	27.3	37.5
72 diam x 56 deep	138.0	88.0	36.2	56.8

When it comes to dry sand molding, mechanical shakeout shows definite savings even though no changes are made in the arrangement of the floor or the equipment. Table II shows savings and increases in production resulting from the use of mechanical shakeout. The figures in table II are particularly interesting because physical conditions are such that the flasks must be picked up from the molding floor by crane, be deposited on a transfer car, be picked up again by crane and then be deposited on the shakeout. In the original setup they were shaken out on the floor where they were poured. However, despite the heavy cost of getting the molds to the shakeout and taking the emptied flasks back to the molding floor, the savings average approximately 25 pct and the increase in production 33 pct.



• • Fig. 7—A large steel casting installation on the West Coast.

Getting into the larger sizes of dry sand molding where shakeout used to be a nightmare with dust storm accompaniment, by far the greatest improvement in standards is found.

Large castings take days to cool to a temperature at which they can be handled without fear of cracking. Consequently the sand used in shaping such castings gets a thorough baking and is usually hard to dislodge from the mold. The old method of heavy hook-on type pneumatic vibrators and the use of bars and sledges was hard on both men and equipment and created an atmosphere that would not meet the requirements of the Health Code. Savings were incidental to meeting State Labor Dept. requirements, and the combination of removing the shakeout operation out of the foundry entirely to a separate cubicle at the end of the flask yard and installation of a large mechanical shakeout (capable of handling upwards of 75 tons in a single load) has resulted in a clean bill of health as far as the foundry is concerned and improvement in standards and increased production, as shown in table III. Actual shakeout time, i.e., the time to free the sand from the flask, is the shortest operation in the chain of operations figured in the standards. In every case the limiting factor was ability to feed the flasks to the shakeout unit. In fact the actual time to free the sand from the cope or the drag of a mold 92x276x50 in. was 55 sec.

Summarizing, then, it is apparent that mechanical shakeout is a faster operation than the previously accepted means of doing the same job; that over a range of flask sizes from 12x16x12 in. to 92x276x70 in. there are actual measured savings in relative shakeout costs of from 16 to 60 pct. It is also apparent that mechanical shakeout coupled with other improvements in arrangement of existing molding equipment (in each case discussed no new molding equipment was added), the addition of sand handling and dust control equipment tends to increase overall production appreciably.

Cost of a mechanical shakeout installation is difficult to project other than after a study of the particular condition under which it is to operate. But with the advent of state laws that demand less pollution in the foundry atmosphere, a dearth of labor and an apparent world wide demand for greater casting production, mechanical shakeout is rapidly becoming an economic necessity rather than a luxury.

High-Temperature Flame Recorder

ROCKET research has been seriously handicapped in the past because the intense heat of the rocket flames destroy thermometers and other conventional temperature measuring devices. In a paper presented at the thirty-second annual meeting of the Optical Society of America, Donald H. Jacobs, laboratory supervisor, North American Aviation, Inc., described a photoelectric device which measures rocket exhaust flames believed to reach temperatures as high as 4000°F.

A light source in the instrument sends one beam of light through the exhaust flame of the rocket and another beam from the same source is bypassed around the flame by a series of mirrors. A system of mechanical shutters causes the two beams to fall alternately upon a photoelectric cell which is connected to monitoring, amplifying, and recording circuits. Studies of the theory of this device are said to show that if the brightness of the light source is varied so that the photoelectric cell always receives the same amount of light from the beam that passes through the flame and the beam that passes around it, the temperature of the rocket exhaust will bear a known relation to the temperature of the light source. It was said to be possible to record automatically and continuously the fluctuations in the temperature of a rocket motor as the motor runs under various conditions.

Solidification of

By J. R. FLECHE
Republic Steel Corp., Cleveland

Implications as regards mold design—the very relation $K = m\left(\frac{a}{D}\right)^{0.219}$ shows that if the problem were to freeze an ingot twice as large in the same time as the comparison ingot of the same type, the wall of the mold would have to be made 47 times thicker. Conversely, an ingot twice as small would require a mold wall 47 times thinner to freeze in the same time. Even if the figures are not accurate, they prove that when one intends to act on the freezing speed of an ingot, he is very closely bound by its very size, and what can be accomplished practically by changing the mold wall is of relatively small importance—or else, wall changes have to be large to be effective.

An attempt can be made to activate freezing in the bottom part of a hot top ingot. Then, the same above relation shows that the shorter freezing time that could be secured by increasing the mold wall thickness by 10 pct could be accomplished by reducing the ingot diameter by only 1.73 pct (dividing it by 1.0173). Consequently, the taper of the body of the ingot is much more important than the increase in wall thickness in the lower part of the mold. With the common speeds of pouring there are indications that the taper should be close to 3 pct on each face.

In the first three parts of this article, THE IRON AGE *Oct. 9, Oct. 23 and Nov. 6, 1947, the author (1) outlined fundamental concepts of solidification phenomena, (2) considered corrections to K values to permit comparisons with other types of steels and ingots, and (3) indicated methods of applying K values to steels of various carbon contents.—Ed.*

For a same type of ingot, it has been found that K is given by the expression K final $= m\left(Z = \frac{a}{D}\right)^{0.219}$ Referring to fig. 29 (see THE IRON AGE, Nov. 6, 1947, p. 98, if the mold wall is increased in size, K takes larger and larger values along curve (OA). Then K is obviously an integration of K_i values varying with $\left(\frac{a}{D}\right)$ as given by the expression:

$$K_i = m \times 0.219 \times \left(\frac{a}{D}\right)^{0.219-1} = \frac{0.219 \cdot m}{\left(\frac{a}{D}\right)^{0.781}} \quad (18$$

and such as represented by curve (BC). Obviously K_i is the temperature drop across the mold wall. This proves that K is proportional to the heat stored in the mold wall at a certain instant. As regards this instant, curve K_i is very steep at the beginning of solidification and considerably leveled off at the end. Consequently, the governing curve K_i must be an average in between, not far from the curve at the time half the area is frozen. From equation (1) it is found that one-half the area is solidified after a time which is only $\frac{8.5}{100}$ of that required for complete freezing. K is therefore proportional to the heat stored in the mold wall at a very early stage of the freezing process. (Incidentally, this remark could be used to derive an approximate expression of the same type as above for K in case of a different mold material, copper for instance, or simply a mold hotter or colder than usual.)

From fig. 29, K_i is theoretically infinite on the inside surface of the mold, as was the speed of freezing at the beginning in fig. 1B. (THE IRON AGE, Oct. 9, 1947, p. 62). In reality, it is very large compared to K_i on the outside. Admitting that the temperature distribution curves through the wall remain in the same order throughout the process of freezing, a thinner mold wall will heat more on the outside, show a smaller temperature differential across the wall, exhibit more movement relative to the ingot after pouring, show less tendency to crack while cooling after stripping of the ingot, and imply a smaller temperature gradient from center to surface for the ingot. In other words, a lighter mold acts more like a sand mold as regards the ingot produced.

As regards rectangular ingots, it has already been observed that walls greatly unbalanced on the two sets of faces may be undesirable. On the other hand, it is a known fact that commercial flat ingots when stripped show cooler corners, implying greater shrinkage and greater tendency to hot cracks at that location, while molds are much hotter in the middle of all faces where the ingot has cooled the least, thus testifying to the

TABLE IX
Calculation of Freezing Times and K Values for Steels of Various Carbon Contents

	Multiply freezing time for 1.00 C steel by	Multiply K value for 1.00 C steel by
For 0.07 C steel	0.7752	1.135
For 0.10 C steel	0.7798	1.133
For 0.20 C steel	0.7922	1.123
For 0.30 C steel	0.8046	1.150
For 0.40 C steel	0.8188	1.105
For 0.50 C steel	0.8341	1.095
For 0.60 C steel	0.8528	1.083
For 0.70 C steel	0.8721	1.071
For 0.80 C steel	0.8985	1.055
For 0.90 C steel	0.9334	1.035
For 1.00 C steel	1.000	1.000

Steel Ingots

Translating his mathematical calculations into down-to-earth, practical observations, the author summarizes the influence of some of the many factors involved in ingot solidification. Also, in this concluding part of a four-part article, implications are made concerning mold design from the standpoint of speed of freezing and steel cleanliness.

improper distribution of the cooling material as supplied by the mold wall. Apparently the ideal mold should have proportionately larger K, Z and A values in the center of the narrow faces, so that the particular freezing times on the two main axes are identical. Otherwise, the wall thickness should be reduced very considerably towards the corners, to palliate corner effects, on mold and ingot as much as possible. Round corners, which store more heat, show lower temperature on the outside, because the mold material at that location is much in excess of the increased cooling power. To put them, as much as possible, in the same stress conditions as the adjacent walls and also to cut down their undesirably high cooling power, their wall thickness should be reduced considerably below the thickness of the adjacent walls, already much thinner than the walls in the middle of the sides. With such directives in mind, it seems possible to design molds, the walls of which will heat more evenly all around, show smaller stresses from face to face, while also insuring more even temperatures and smaller stresses all around the ingot. The same directives, of course, apply also to square molds.

Sulfide segregations in rimmed steel are trapped in an early stage, all over the ingot section, simultaneously. Commercial flat molds with walls usually heavier on the wide faces often lead to ingots showing a proportionally heavier skin under such segregations on the wide faces. This may be beneficial from several viewpoints. But the problem, on the contrary, may be to move the sulfide inclusions deeper on the edges, and this can be accomplished by increasing the thickness of the walls on the narrow sides.

It should be remarked that this play of heat transfer may be considerably upset in practice because of uneven temperatures on the various sides of the molds at the time of pouring, simply as a result of the relative orientation of the molds in a drag. This may dictate a preferred orientation, or at least explain deviations from the above laws, and help to correct them.

Conclusions

In the solidification of balanced ingots such as those of square and round sections, it is found that the K value, defining the rate of freezing through the relation $D = K\sqrt{T}$, is not a constant throughout solidification, but shows an increase from beginning to end for the ingots here considered. It may be predicted to show a larger or smaller increase or even a decrease, depending mainly on the size of the mold wall relative to the ingot dimension. So far as the time for complete freezing is the main question, the end value of K is of prime importance and is mainly considered here. A way to calculate such final K values is summarized hereafter.

It is further found that such final K values may be used to rate the freezing power of various elements of mold walls in such a manner that the freezing power of any mold in general can be obtained by adding the freezing power of the various parts of its walls.

In the problem of assigning numerical values to the K factor, it is found that they depend on a number of influences, some of which can be overlooked because they have a fairly constant average effect. Factors sometimes overlooked are:

(1) The nature of the material of the mold. There is no evidence that cast iron, the common mold material here considered as standard, is responsible for important fluctuations in the rate of freezing. Another mold material, however, copper for instance, would call for a re-estimation of the K values obtained in this study.

(2) The temperature of the mold. Molds having an average temperature around 200°F, as assumed here, seem to have a constant average influence; but there is evidence that molds much colder or much hotter than average will respectively increase or decrease the freezing rate considerably, but in proportions which it is not attempted to estimate here.

(3) The degree of superheat of the steel, which no doubt may have some influence on the freezing rate, but appears to average itself in the examples used here.

The factors which are estimated here are:

(1) The heaviness of the mold walls. Heavier walls command faster freezing. It is found that in any case, the average rate of freezing up to the end of solidification is proportional to a small power of the relative wall, that is of the ratio $\frac{\text{wall thickness}}{\text{vector of steel to freeze}} = \frac{a}{D} = Z$. This leads to an expression of the form $K = mZ^n$, with n here found to equal 0.219.

(2) In any ingot, it is also found, that the average speed of freezing up to the end of solidification is directly proportional to the ratio of the surface of contact between ingot and mold to the volume of the ingot. That is, the so-called cooling surface: Volume ratio. But walls which are concave towards the ingot, as in a round mold, apparently because they provide more cool-

ing material for the same thickness, insure faster freezing than flat walls. Undoubtedly, convex walls, in turn, command slower freezing. This change in cooling rate is quite comparable to the effect of more or less drastic quenching media in the hardening of steel bars and it is reflected in different values of the factor (m) in the last equation.

(3) The relative length of the ingot. A shorter ingot will benefit from a greater cooling effect from the mold bottom (if made of the same material as the mold proper) and therefore exhibit a greater K value for no other reason. This increase is estimated hereafter.

(4) A hot top will supply additional heat to the body of the ingot and therefore decrease the apparent K value. This effect is estimated hereafter.

(5) For the same median cross-section of ingot and consequently the same volume of steel, the taper of an ordinary mold will reduce the apparent K value measured at the top, while the inverted taper of a hot top ingot will make it appear larger. A way of taking this effect into account is indicated hereafter.

(6) Corrugations will increase the speed of freezing measured on the same average cooling vector. This effect can be measured by summing up th K values of each element, just as for any mold shape.

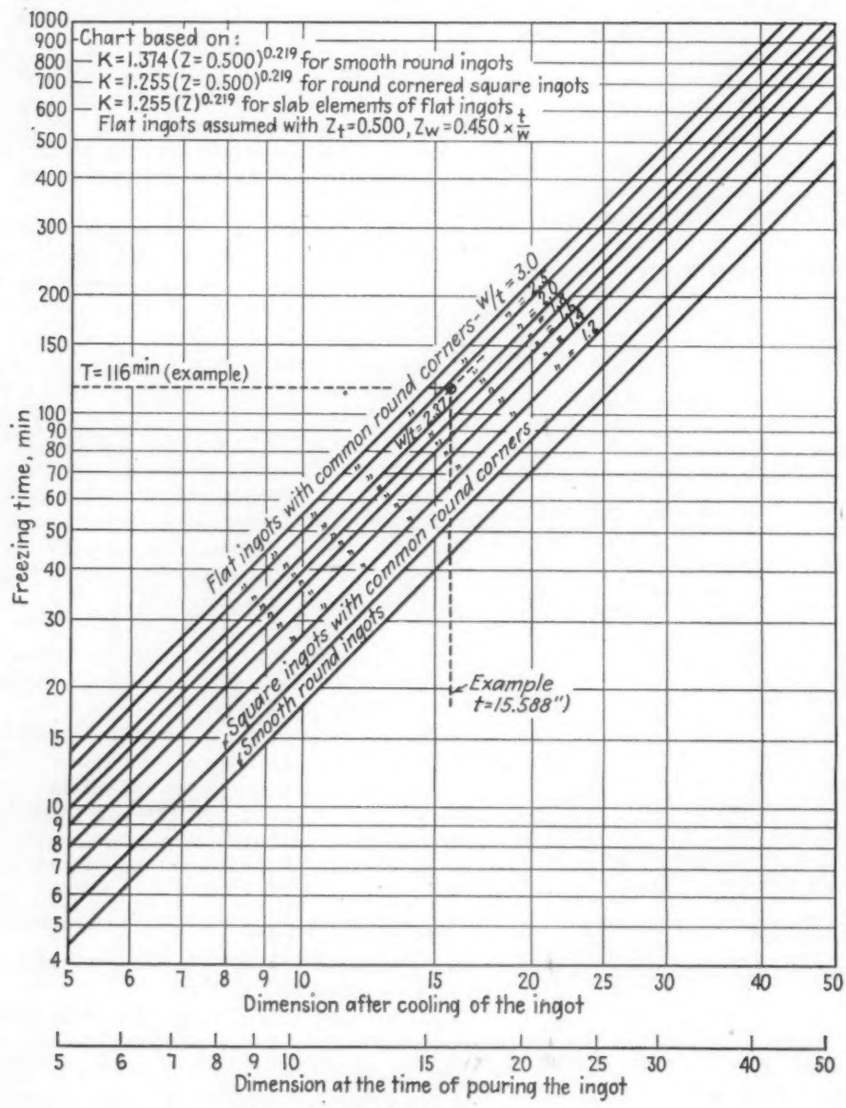
(7) The carbon content of the steel. It is found that a 1.00 pct C steel takes 1.29 times as long to freeze as a 0.07 C steel. Relative times for intermediate carbon contents are given hereafter.

In brief, the following factors have been determined for a 1.00 C steel, L/C—3, no hot top, no taper, no corrugations, cast iron molds, and all values referring to end of solidification only:

K for smooth round ingots..... $= 1.374 \cdot Z^{0.219}$ (10)

K for round cornered square ingots with corner radius = 11 pct the side of the square and even wall all around..... $= 1.255 \cdot Z^{0.219}$ (11)

K for sharp cornered square in-



LEFT

FIG. 30—Determination of freezing time for flat ingots with common round corners, square ingots with common round corners, and smooth round ingots. Conditions are: $L/c = 3$; no hot top; no taper; 100 C steel.

RIGHT

FIG. 31—Chart indicating determination of freezing time, taking into consideration (1) actual Z values, (2) average L/c values, (3) hot top values in percent of whole ingot, (4) product of taper on each side by L/c, and (5) carbon content of the steel.

gots with no solid corners (as made up of two slabs) .... $= 1.285 \cdot Z^{0.219}$ (14)

K slab (for cooling power only and not for linear rate of freezing) ..... $= 0.6425 \cdot Z^{0.219}$ (15)

with $Z = \frac{\text{mold wall}}{\text{vector of steel to freeze}} = \frac{a}{D}$, as measured in the top section of the ingot, eventually right under the hot top, at the time of pouring.

K as above, applies to the formula $D = K\sqrt{T}$, in which D is a dimension in the cold, after complete cooling of the ingot and is expressed in inches, providing T (time) for complete freezing counted from the instant the mold was filled, is expressed in minutes. If D after shrinkage is not available, it can be estimated with a small error by dividing D at the time of pouring by 1.03.

As regards correction for relative length of the ingot L/C, the relative K value compared to K for $L/C = 3$, can be obtained from fig. 13. (THE IRON AGE, Oct. 23, 1947, p. 57). The multiplying factor is larger than 1 for $L/C<3$ and smaller than 1 for $L/C>3$.

Correction for hot top is necessary, since with a hot top, the K value is reduced and can be obtained by multiplying K, as above, by

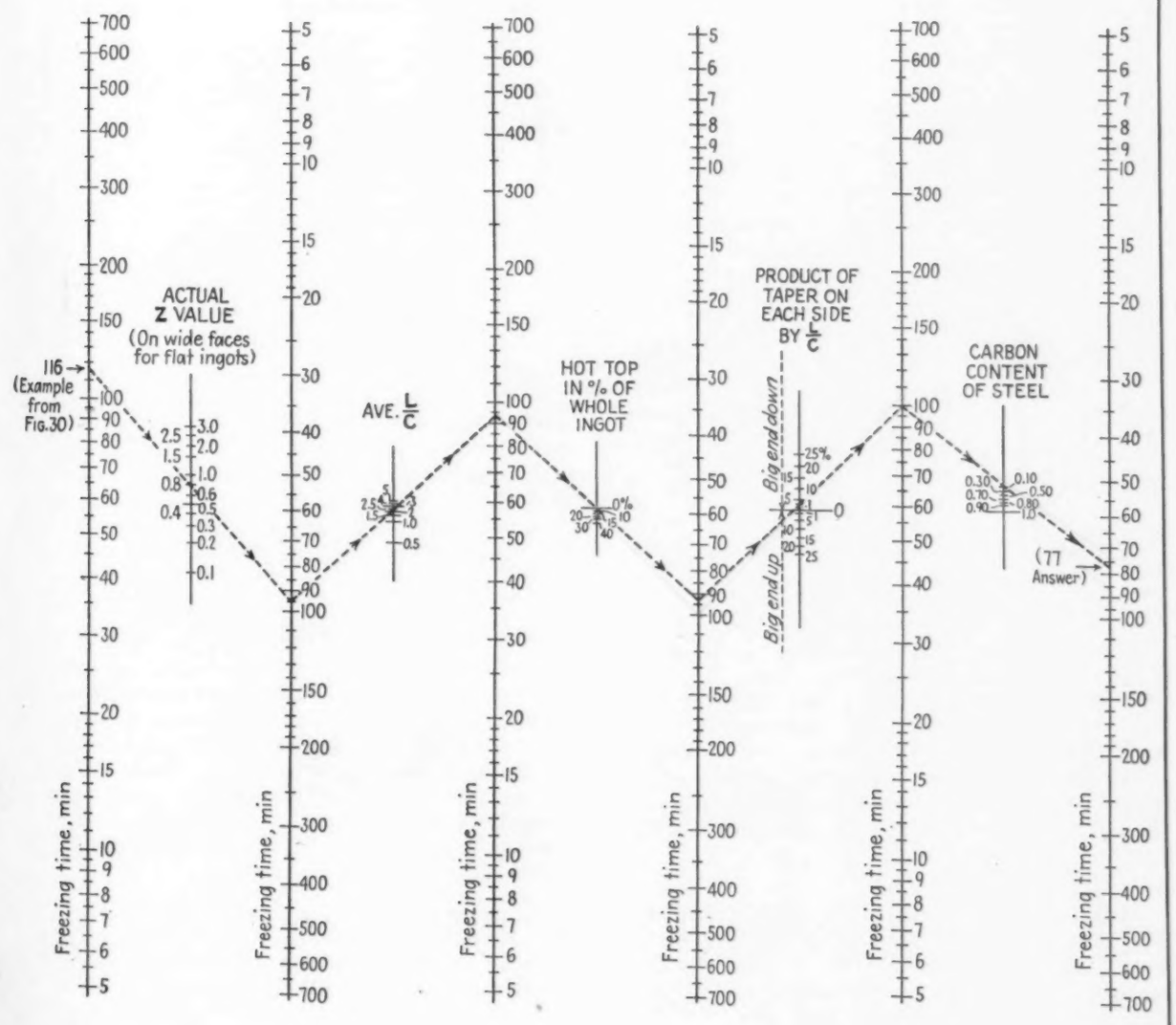
$$\sqrt{\frac{100 - \text{pct hot top}}{100 - 0.75 \times \text{pct hot top}}} \qquad (7)$$

The taper will increase or decrease the K value as follows:

Hot top ingot, big end up—K, as above, x (1.00 + taper on one side x $\frac{L}{C}$ for corresponding face). (8)

Ordinary ingot, big end down — K, as above, x (1.00 — taper on one side x $\frac{L}{C}$ for corresponding face). (9)

In figuring the total K value of a composite mold, partial K values, as above, must be entered with an "efficiency" factor which is the ratio of the fractional area connected with the element



of wall under consideration to the full cross-section of the ingot.

Such partial K values must also be transposed onto the one radial cooling vector used for measurement. In case the partial K values are expressed on the vectors going to the ingot center, they are transposed onto the one vector used for estimation by simple proportionality of the vector lengths involved. In case a partial K value is expressed on a vector not reaching the ingot center, the transposition factor is:

$$\frac{J}{J^{0.219}}, \text{ or } J_1 \times \frac{1}{2}\left(\frac{1}{J_1^{0.219}} + \frac{1}{J_2^{0.219}}\right) \text{ or}$$

$$J_2 \times \frac{1}{2}\left(\frac{1}{J_1^{0.219}} + \frac{1}{J_2^{0.219}}\right),$$

regarding which reference is made to the text for more detailed explanations.

Correction for carbon content of the steel. The freezing time or K value for 1.00 pct C steel being determined as above, the corresponding values for ordinary steel of lower carbon content can tentatively be obtained by applying the corrections indicated in table IX.

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[4] J. B. Austin, "The Flow of Heat in Metals," book published by ASM, 1942, p. 101; also T. F. Russell, Special Report to British Iron & Steel Inst., vol. 34, 1936, p. 149.
[5] C. B. Post and W. H. Fenstermacher, "Rate of Cooling in Blocks and Cylinders," Trans. ASM, 1944, vol. 33, p. 19.
[6] V. M. Tageev and B. B. Gulyaev, "Solidification of Ingots," Metallurg, 1939, vol. 14, No. 8, p. 23.
[7] G. Sacks and K. R. Van Horn, "Practical Metallurgy," ASM, 1940.

German Wartime Technical Developments

REPORTS of German practice in various technical fields of interest to engineers and executives in the metalworking field, issued by the Office of Technical Services, Washington, are briefly described below. Copies of the reports listed below may be obtained in either photostat or microfilm form, as indicated. Orders for copies of these reports should be addressed to Office of Technical Services, Department of Commerce, Washington 25, D. C., giving the "PB" identification number. See THE IRON AGE, June 27, p. 67, Aug. 29, p. 39, Sept. 26, p. 80, Oct. 10, p. 67, Nov. 14, 1946, p. 81, Jan. 9, 1947, p. 64, Jan. 16, p. 53, Mar. 6, p. 70, Apr. 17, p. 57, July 3, p. 66, July 31, p. 62, and Oct. 9, p. 77, for a list of earlier reports.

Machine Tool Practice—Combination boring and milling machines and swivel head vertical milling machines were two of the very few machine tools developed by the Germans during the war, according to this report. A giant machine for turn milling the crank pins and adjacent web faces of large diesel motor crankshafts is described. *PB-63855; photostat $6.00; microfilm $2.00; 78 p.*

Hydraulic Turbines—Improvements in Kaplan and Francis hydraulic turbines made in Germany in recent years and new turbine designs resulting in reduced operating costs, better efficiency, prevention of cavitation, and extension of speed ranges, are described. None of the German designed Kaplan units have so far exceeded the capacity of the American Bonneville unit of 60,000 to 85,000 hp but some are being planned for Russian power projects with 250,000 to 280,000 hp, according to the report. *PB-63777; photostat $4.00; microfilm $2.00; 53 p.*

Cast Iron Roll Manufacture—Casting procedure used in the manufacture of a special compound roll for cold-rolling sheet metal is described in a report on German cast iron and steel roll manufacture. Finished rolls are said to possess the desirable quality of a soft core and hard outer shell. Rolls thus manufactured consist of an outer layer of hard alloyed white iron, a sharp line of demarcation, and an inner core of soft grey iron of different analysis. *PB-60389; microfilm $3.00; photostat $9.00; 135 p.*

Magnet Steels—Notes on the production of cast and sintered alnico magnets and four permanent magnet alloy steels are given in this report. Some iron powder pressings, including alnico magnets, were being made with rosin binding, the report states. A translation of a technical paper supplied by Krupps Powder Metallurgy Laboratory on experimental work carried out in the production of sintered alnico magnet material is included. *PB-75880; microfilm $1.00; photostat $3.00; 33 p.*

Continuous Casting Process—British investigators report on a continuous casting process for aluminum alloys involving the use of a shallow, water cooled mold, the bottom of which is lowered in step with the rate of pouring. Detailed descriptions of the equipment and operating methods of seven wrought light alloy plants are also given. *PB-55967; photostat $8.00; microfilm $3.00; 106 p.*

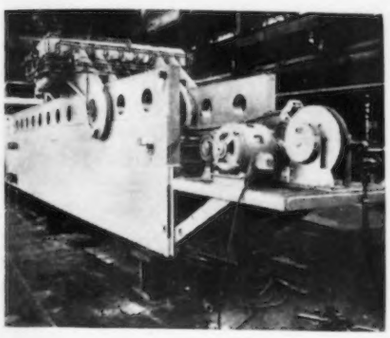
Lithopone and Barium Compounds—Report gives complete details of the lithopone producing methods used at the three major German plants, and covers thoroughly the methods of manufacture of barium sulfate, barium chloride, barium carbonate, barium monoxide, and barium peroxide. *PB-75846; photostat $3.00; microfilm $1.00; 33 p.*

New Equipment . . .

New developments in projection welders, production milling machines, a salt bath furnace, fume separator, pulverized coal-fired foundry furnace, thermocouples, an automatic scaling unit, and gear pumps are discussed in the following pages. Electric hoists, flexible tubing, socket wrenches, packaging plastic, and photographic paper are plant service items reviewed.

Plate Stretcher-Leveller

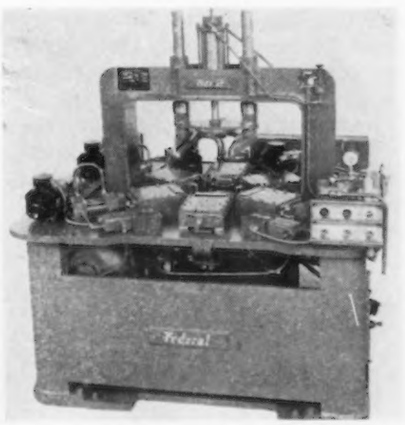
A LARGE hydraulic plate stretcher-leveller of special design has been manufactured by *Hydropress, Inc.*, 570 Lexington Ave., New York 22. This machine is of the selfcontained oil-hydraulic type, with a capacity of 825 tons and is adapted to accommodate plates or sheets up to 100 in. wide. Maximum length of plates may be 33 ft



and minimum length 7 ft. Two gripheads are provided; one is actuated by the hydraulic stretching cylinder, while the position of the other is adjustable to compensate for the varying length of the plates. The machine is operated by remote control from an operating panel. Pressure adjustment range is sufficient to allow for handling thinner and narrower plates.

Special Projection Welder

DEVELOPMENT of a new type welder designated as the Federal special triple head projection welder for welding mounting brackets to cooling fins on compressor assemblies has been announced by *Federal Machine & Welder Co.*, Warren, Ohio. With a machine cycle time of approximately 5 sec the machine is said to produce 150 assemblies per hour. The welder is equipped with two locating current-carrying dies and one hydraulic cylinder operating clamp die. The three projection heads are hydraulically-operated and incorporate spring clamping devices for locating the mounting brackets.



The welding head dies incorporate an equalizer which insures equal pressure at all four projections. The welding heads, operating in conventional type slides are so arranged that the brackets are held to a tolerance of ±0.010 in. for the two different sizes which the machine is capable of welding. The machine is equipped with a 150 kva welding transformer wired for 440-v, 60-cycle current, with eight steps for heat regulation.

Production Milling Machine

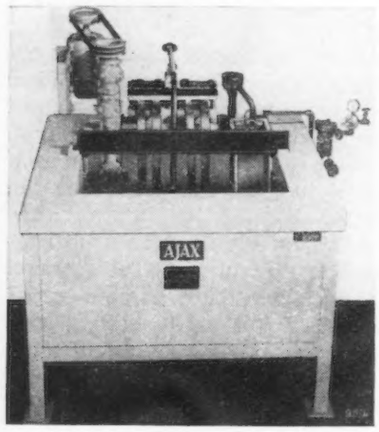
A PRODUCTION milling machine, the No. 000-4 unit type, has been developed by *Cincinnati Milling Machine Co.*, Cincinnati 9, especially for the rapid production of small parts required in the manufacture of sewing machines, business machines, firearms, small tools, etc. It is comprised of four individual milling machines of extremely small size mounted together on a single base. Four separate operations may be performed progressively by the different units. The machines are completely hydraulic, having piston and cylinder table feed and balanced, axial-type hydraulic motors for spindle drive. Each machine is, in effect, a miniature, fixed bed, manufacturing type machine. Bed and column of each unit is cast in one piece and the spindle carrier is adjustable mounted on square-gibbed bearing ways on the column. Table travel is 4 in. and vertical adjustment of spindle carrier is 3 in. ranging from 2 to 5 in. between top of table and centerline of spindle. Table feed ranges from 1 to 40 ipm;

spindle speeds from 500 to 1800 rpm. Table rapid traverse rate is 200 ipm. Feed and speed rates for each machine are selected independently of other machines.

Salt Bath Furnace

FOR use with the Ajax isothermal heat treat process, a new design of the Hultgren electric salt bath furnace has been offered by *Ajax Electric Co.*, Frankford Ave., Philadelphia. The furnace employs the principles of a heat exchanger to hold the quenching bath at a constant temperature. It is provided with a motor operated, high capacity, submerged pump, the outlets of which subject the work to a fast moving stream of molten salt which gives the quenching power of warm oil, thus assuring uniform and maximum quenching speed of each individual piece introduced into the furnace, it is said. In martempering and austempering,

a salt separator is immersed directly in the isothermal quench bath. This separator is comprised of a screen filter and an air pump. The air pump lifts the liquid salt from the main bath into the filter, during which passage the salt is cooled with a resultant precipitation of the salt contamination. The precipitate is collected in the screen filter and the clarified quench salt



returns to the bath. The quench bath is thus kept clean automatically and no replenishment is necessary except for the normal drag-out. The isothermal quench furnace can be heated either by immersed electrodes for high temperature work, or by immersion heating elements for low temperature work.

High-Vacuum Valve

DESIGNED for direct operation, a solenoid high-vacuum valve requiring no pilot or other medium for operation has been introduced by *Airmatic Valve, Inc.*, 1643 E. 40th St., Cleveland. The valve operates on 110 dc current and is described as offering instant control over high vacuum systems. It is of poppet design having corrosive-resistant internal parts. To provide a positive seal that makes the valve leakproof, resilient synthetic rubber-type seating is provided. No packing is required.

Angle Type Strainer

A STRAINER has been designed by *J. A. Zurn Mfg. Co.*, Erie, Pa., with an angle construction so that it may be installed directly upon the unit that it is to protect. These strainers are commonly used with pumping equipment and other close tolerance units. The strainer may be used at any point in a pipe line where it can serve as, or replace a right angle connection. Various types are made with pressure ratings of 125, 150, 250 and 300 lb. Strainer basket material and perforations are furnished to specifications as required for each installation. The body and cover assemblies are available in cast steel, semi-steel or bronze.

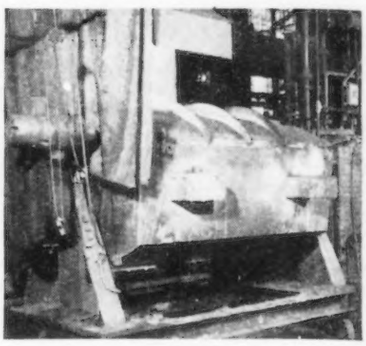
Fume Separator

A FUME separator which is said to clean contaminated air without the loss of room heat has been developed by *Industrial Electroplating Co., Inc.*, 219 W. Vermont St., Indianapolis, Ind. The unit draws contaminated air off electroplating tanks, cleans it by water absorption and centrifugal separation, and returns pure air to the shop without wasting heat, it is reported. The manufacturers recommend the air cleaner for the control of fumes from such solutions as anodizing, chromic acid, caustic soda, caustic oxydizing, sulfuric acid, and all cyanide solutions. Two models are available, one having a capacity of 1500 cfm

and the other a capacity of 3000 cfm. Each model is available with separating chambers of plain carbon steel or stainless steel.

Foundry Furnace

DEVELOPMENT of a pulverized coal-fired unit, known as the Whiting Heated Metal Mixer, for foundries making small thin-sectioned castings, has been announced by *Whiting Corp.*, Harvey, Ill. It is said to be particularly adaptable where such castings are made on a production basis and molds are poured continuously on a moving conveyer. The Heated Metal Mixer is a small portable tilting furnace, having 6000-lb capacity, which is fired with pulverized coal from a No. 1 pulverizer. Metal is transferred from the cupolas in a top-pour ladle to a mixer located adjacent to the mold conveyer. Metal temperatures are maintained and are said to be even



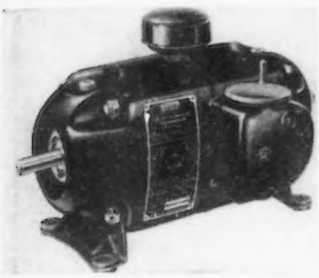
somewhat increased above that of the cupola metal. Composition is claimed to be held uniform with adjustments made in the furnace, if desired. The pulverizer has a capacity of 100 lb of coal per hr. The tilting mechanism is operated by a pendant push button control unit. Overall space requirement is 8 x 28 ft.

Thermocouple

A SENSITIVE nickel and nickel moly thermocouple designed to stay on calibration in reducing atmospheres at temperatures as high as 2100°F has been announced by *General Electric Co.*, Schenectady 5, N. Y. The thermocouple measures temperatures in protective atmospheres in heat-treating of steel and malleable iron, and in copper brazing. The thermocouple element, supported by ceramic insulators, is sheathed in a special alloy protection tube which is welded at the hot end to make it air tight. It makes physical contact with the end of the tube to assure rapid response. A gas-tight adapter is welded to the alloy tube at the terminal end. The adapter screws onto a 1-in. pipe which is welded to the steel furnace casing to make a gas-tight connection with the furnace. The nickel and nickel moly wires are butt welded together before assembly. A standard chromel-alumel thermocouple extension lead wire connects the thermocouple to the temperature indicating instrument.

Variable Speed Transmission

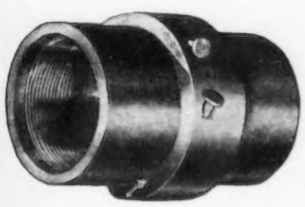
DEVELOPMENT of a variable speed hydraulic transmission for fractional horsepower machinery drives has been announced by *Vickers Inc.*, 1420 Oakman Blvd., Detroit. Features of the transmission include smooth and stepless speed adjustment from zero to maximum output rpm, in either



direction of rotation. Full and constant torque power characteristics are maintained throughout the entire speed range, it is reported. The input shaft may be driven in either direction without mechanical change and the unit is equipped with automatic overload protection. It is rated at ½ hp, continuous duty. Finger-tip speed adjustment over the complete range is obtained by either handwheel or servo control.

Pipe Couplings

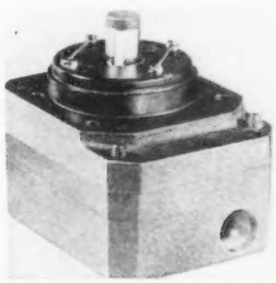
UNDER the trade name Nail-It-Kwik, pipe couplings, mud guns, swivel joints and pump suction couplings are being manufactured by *Hinderliter Tool Co. Div., H. K. Porter Co., Inc.*, Tulsa, Okla. The coupling principle and sealing method are said to be fast. Halves of the unit are coupled by driving common nails into mating grooves in the male and female ends and



are uncoupled by merely pulling the nails. Two or more nails are used on each coupling to form a removable steel shear ring of great strength. Oil-and-wear resistant synthetic O-ring gaskets form pressure tight seals in the products. No mechanically applied compression is necessary to effect a seal, and scarring or abrasion of the sealing surfaces will not cause leakage, it is said, as the O rings seal between mating surfaces.

Hydraulic Gear Pumps

TWO hydraulic gear pumps, models 9000 and 9075, announced by *Aro Equipment Corp.*, Bryan, Ohio, have been developed for continuous service at pressures up to 1000 psi and for intermittent service at pressures up to 1500 psi. Model 9000 has a capacity of 8 gpm displacement at 1800 rpm; model 9075 has 15 gpm displacement at 1200 rpm. The pumps are suitable for pressure lubrication and oil hydraulic service in systems ranging from 100 to 1500 psi. Pumps have a pilot-type flush mounting face for direct attachment to machinery or equipment. They can be directly



driven or used with belt, gear or chain drives. A line of 2, 3, and 4-way valves has been designed by Aro for use with the company's hydraulic gear pumps. Included are models having integral relief valves to control the system pressures, and a neutral position to unload the pump between operating cycles.

Flexible Tubing

FLEXIBLE tubing made with Inconel innercore and braid has been announced by *Titeflex, Inc.*, 554 Frelinghuysen Ave., Newark, N. J. The hose may be supplied for temperatures up to 1700°. The innercore of the tubing is supplied with wall thicknesses of 0.005 to 0.015 in. The hose may be supplied with flat ribbon or round wire braid, the flat braid, recommended for higher pressures and resistance to fatigue, especially to sizes of 1 in. or more. The flexible tubing is recommended for extreme service conditions where Monel metal or brass would be affected.

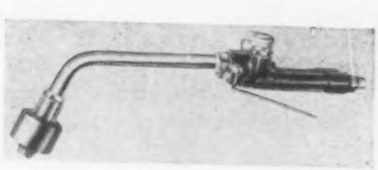
Automatic Scaling Unit

A SCALING device for use with Geiger-Muller counters in radioactivity research has been announced by *Instrument Development Laboratories*, 223 W. Erie St., Chicago 10. The scaler, known as model 163, incorporates facilities for predetermined count and predetermined time operation. A new

Countomatic switch allows the selection of 10, 100, or 1000 times the selected scaling factor for any predetermined count. This scaler is designed to automatically shut off after this predetermined number of counts has been recorded, up to a maximum of 64,000, and will indicate the time required for these counts if connected to an electric timer. In addition to the automatic count feature, the scaler can also be used to count for a predetermined time or for manual counting.

Gas-Air Blowpipe

DESIGNED for use with manufactured or natural gas, propane and compressed air on heating, annealing or soldering operations, a gas-air blowpipe, designated the Weldimatic model C-4, has been announced by *Weldit, Inc.*, 990 Oakman Blvd., Detroit 6. Built of special aluminum alloy, the blowpipe features lightweight, increased capacity, and improved balance and grip, over former models. The unit automatically reduces the flame to



a small pilot light during idle moments. Upon grasping the handle to resume work, the blowpipe relights instantly at the original adjustment, it is reported. Its long lever provides for easy flame control regardless of the position in which the blowpipe is held.

Electric Hoists

BUILT in capacities of 250 to 2000 lb, Speedway electric hoists have been introduced by *Wright Hoist Div., American Chain & Cable Co., Inc.*, York, Pa. Among the design and construction features of the hoist are the grooved drum which accommodates a 12-ft lift with no over-winding; push-button control; preformed wire rope with swaged fittings for anchoring; Timken tapered roller bearing trolleys; and standard NEMA motor frames and ratings. Hoists are furnished with lug, hook or trolley suspension.

Socket Wrenches

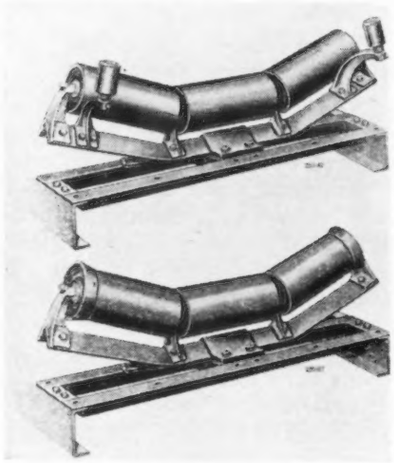
NUGGET socket wrenches are now available from *Blackhawk Mfg. Co.*, Milwaukee 1, in the No. 49K assortment which has a wrench chest with wheels and skids for scooting on shop floors. The set contains 49 double-duty drive socket wrenches weighing only 12 lb 2 oz. Through the use of Hexite alloy steel for the wrenches Blackhawk claims that the 49 wrenches do the work comparable to 65 wrenches in the ⅜ and ½-in. drives. Sockets have 7/16-in. double-duty drive plus patented lock-on and thumb release features.

Plunger Clamp

PRODUCTION on an extra heavy duty plunger clamp, model 640, called the Ram, has been announced by *Detroit Stamping Co.*, 345 Midland Ave., Detroit. Capable of exerting over 2500 lb normal pressure, it is reported, the Ram's outstanding feature is that the handle is down when the clamp is closed. Operating motion is downward and away from the work. The device is adaptable to such conversions as light arbor, punch and forming presses, for alignment of metal parts in large fixtures, or for heavy duty clamping of parts for milling, drilling, cementing, welding or other production operations requiring fast, uniform, and powerful action. The Ram is 15¾ in. overall, 3¼ in. high, when closed. Plunger travel is 1¼ in.

Self-Aligning Idlers

ANNOUNCEMENT of improved types of self-aligning idlers for belt conveyer systems has been made by the *Jeffrey Mfg. Co.*, Columbus 16, Ohio. Illustrated are the positive type idler (above) with guide rollers and (below) the self-aligning idler with flared, friction-type end pulleys said to be particularly adaptable for reversible belts.



Plug-In Panelboard

IMPROVED utilization of space on walls and columns is claimed for NMO plug-in type panelboard with coilless magnetic multi-breakers which is manufactured by *Square D Co.*, 606 Rivard St., Detroit 11. Because of small size, the panel affords 5½-in. gutters in a 15-in. wide panelboard. Twice the number of circuits previously available in cabinets of similar size are said to be provided. The plug-in feature of the panelboard facilitates removal or insertion of multi-breaker units for future changes in circuit ratings or for additional circuits. These breaker units are mounted on silver-surfaced buss bars by means of positive pressure contact jaws. Adequate time lag for starting motors and tungsten lamp inrush currents is provided. The breaker units regularly provide four single poles which can be readily converted into two double poles by the insertion of handle ties. NMO panelboards are furnished in 100 and 200 amp main ratings, 120/240 v ac with 15, 20 and 30 amp branch circuits.

Packaging Plastic

THERMO-DIP N.S., a hot melt compound for protecting machine tools, cutting gears, etc., from corrosion, abrasion and the hazards of shipping and handling, has been announced by *Eronel Industries*, 5714 W. Pico Blvd., Los Angeles. The coating is pale amber, and transparent so that identifying marks can be read. It is easily removed by stripping, it is said, can be reused repeatedly and maintains its flexibility and properties over extended periods. It has resistance to salt water, high humidity, low temperature.

Photographic Paper

SILVER-sensitized paper for reproducing engineering drawings on blueprint or direct process equipment has been developed by *Eastman Kodak Co.*, Rochester 4. Known as Kodagraph Autopositive, the paper embodies a new type emulsion which permits its use in normal room light and produces a high-contrast positive copy directly from a positive original. Such copies are intended primarily for use as printing intermediates or masters and make possible quick production of blueprnits or diazos. The photographic image has long life, it is claimed, making the reproductions of value as file copies.

Adjustable Anode Rods

DEVELOPMENT of an adjustable rod for use in alkaline solutions and also chrome baths to permit more uniform plating of irregularly shaped parts in still plating tanks, has been announced by *Hanson-Van Winkle-Munning Co.*, Matawan, N. J. The device consists of brackets welded or bolted to the tank wall to which steel plates or arms, insulated on either side with Phenol fiber, are pivotally attached. At the outer end of these arms are swivel fittings on which are mounted annular clamps containing insulators which surround and support the anode rod. The rod is said to be capable of supporting several hundred pounds of anode material.

Lead Anodes

DIVCO 71-point lead anodes, 12 ft long with special high conductivity hooks, for chromium plating long sections of tubing and pipe have been offered by *Division Lead Co.*, 836 W. Kinzie St., Chicago 22. In addition to the high efficiency and great throwing power of the design, it is claimed that the deep ribbed construction minimizes buckling and warping. Special and conforming anodes, as well as standard anodes, are manufactured using the 71-point design.

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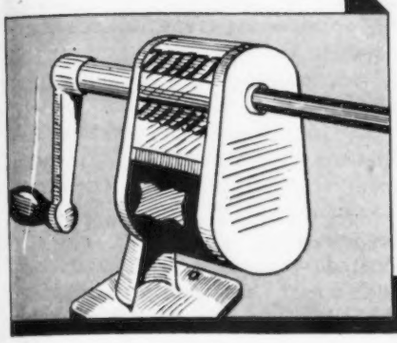

THEN

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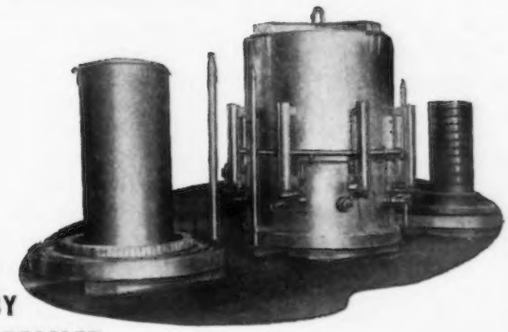
Building furnaces is *not* KEMP's business — but building their carburetion-and-combustion systems *is* KEMP's business. Make sure your next furnace installation is KEMP-fired.



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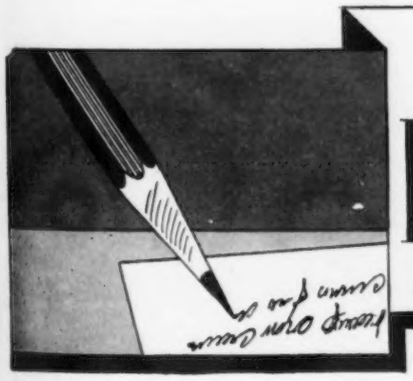

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WALTER G. PATTON

• Leading industrial designer sees more functional styling in tomorrow's cars . . . Studebaker announces its 1948 models.

DETROIT—According to Brooks Stevens, industrial designer, who addressed the members of the American Society of Body Engineers meeting in Detroit this week, it is entirely possible that tomorrow's automobile will have less subterfuge, less "big package" with a lot of chrome and a keener sense of product integrity.

If Mr. Stevens failed to win complete agreement on this point from the assembled Detroit Body Engineers, he at least succeeded in challenging some of the most deeply rooted concepts of modern motor car designers. Mr. Stevens is a strong advocate of functional design and this should be kept in mind in interpreting his comments on "Where Do We Go From Here in American Passenger Car Body Design and Styling."

A close observer of design trends, Mr. Stevens pointed out to his listeners that, generally speaking, the auto industry has been a distinct disappointment to the Sunday supplement feature writers who had thoroughly prepared the motorists of the county to expect what he called the "Buck Rogers Beetle Car" of the postwar era.

Instead, he pointed out, the postwar cars actually in production are on the conservative side and reports are current that some manufacturers have already abandoned initial plans and designs, as well as costly tools and dies, in order to bring their new models more in line with market conditions and public reactions to the postwar models already introduced.

This has definitely happened in the case of at least one General Motors' model and several other car producers who had planned to introduce new postwar cars early in 1948 have set their programs back several months it is reported. While the announced reasons for postponement have indicated that the setbacks are merely "delays," some Detroiters close to the automotive picture will not be surprised if more tools and dies are scrapped and an almost new start is made by several automobile producers.

Emphasing the fact that current auto design trend is in the direction of conservatism, Mr. Stevens called attention to the fact that the public was certainly set for a "Buck Rogers Beetle Car" when the Kaiser-Frazer was announced. What the public got instead, he argued, was a dignified conservative vehicle, with a definite postwar design motif.

An outstanding feature of the Kaiser-Frazer cars, Mr. Stevens pointed out, was connecting the high points of the front and the rear fenders in a continuous panel. This styling he characterized as a "pontoon-side" body-styling that eliminates the individual fender bulges. There are real benefits, he argued, from this type of styling including increased interior body width and greater seating room for passengers. This is an established design trend, he admitted, but it has at least one definite drawback: It is going to make it increasingly difficult for manufacturers to individualize their cars.

COMMENTING on the new Studebaker, Mr. Stevens pointed out that this model had considerable originality as well as individuality and has probably given the public "one last look at a rear fender." Studebaker's departure from the use of softly rounded surfaces in favor of quick hooks or curvatures at the leading and trailing edges gives a strong illusion of length, he said, and in his opinion, this feature adds character to the car and therefore has advantages the car designer cannot afford to ignore.

Looking into his crystal ball, Mr. Stevens sees ahead a pronounced trend for the industry in the direction of more forward engine mounting, shorter bonnets, more centrally located passenger compartments, with wider seats and greater glass area. He does not look for any miraculous new transparent synthetic material that provides vision, strength, and resistance to weather to replace existing materials. Almost surely, he said, car designers will lower the belt line of the car to give improved vision before they go to transparent plastic tops.

Mr. Stevens foresees in addition to shorter hoods, a further depression of the center profile line of the bonnet to give better vision and possible elimination of radiator ornaments which he characterizes as a colored plastic "V-2 bomb with pseudo aerodynamic chrome fins."

The long wrap-around bumpers are here to stay, he believes, but something will have to be done about the long sweep of metal at the side of the body of the new postwar cars which is relatively unprotected against side-swiping, garage door jams and the "greatest body repair shop salesroom"—the parking lot. These sheet metal sides ought to be protected, he emphasized by a three-dimensional, heavy chrome molding, a fluted stainless steel lower skirt, or laminated hard sheet rubber extending to the lower third or so, of the panel side.

THIS industrial designer hopes to see an end in the not too distant future, to the "rounded, bulbous nose atop a low chrome-plated grille" which he characterized as a chrome-plated complexity —a homogenizing of bars, fins, and

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Hydraulic, centering-type chucks on all 3 spindles . . . each chuck operated by individual foot-treadle, freeing operator's hands . . . saddle and tool slide travel on vertical ways, free of chip area . . . full chip control, including automatic breakage for disposal, and prevention of accumulations around operating parts . . . complete visibility and accessibility of work and tools . . . massive weight and over-all rigidity assure minimum vibration for maintained accuracy . . . Man-Au-Trol control, head stock and all other machine-operating controls are at operator's right.

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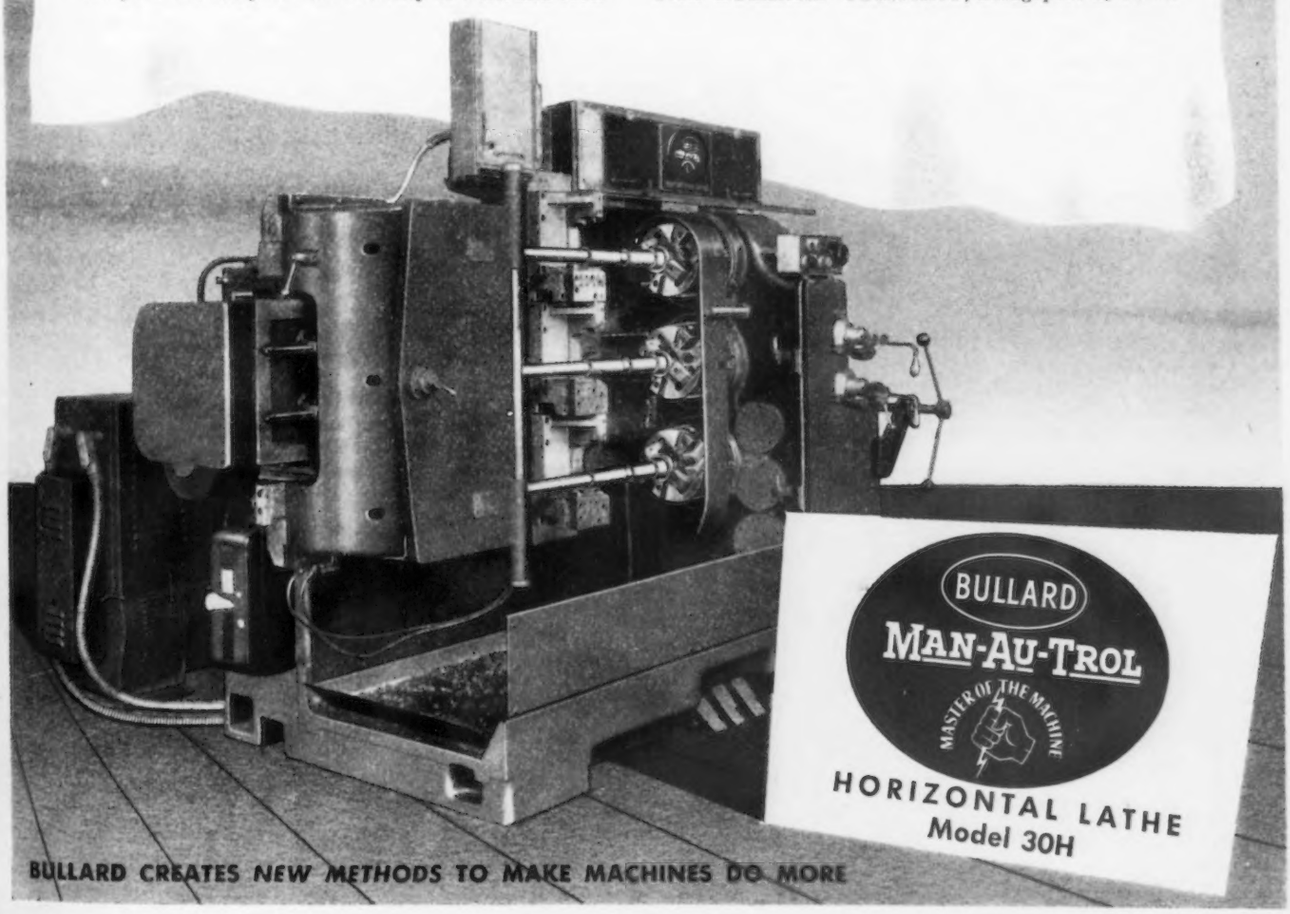
Providing manual operation on short runs, Man-Au-Trol enables quick conversion to 100% automaticity on longer runs. Controlling the head through *39 separate functions in any sequence*, it allows the machine to cut practically continuously, without stops for customary manual operations or loss of time due to the human element. While retaining the versatility of manual control for short runs, this new BULLARD machine can be quickly changed to fully automatic operation on production of 3 identical parts at once — substantially lowering manufacturing costs.

Why not find out how this cost-saving combination can benefit your own production? Engineering data and other facts on the new BULLARD Man-Au-Trol 3-Spindle Horizontal Lathe gladly sent on request. THE BULLARD COMPANY, Bridgeport 2, Conn.



BULLARD CREATES *NEW METHODS* TO MAKE MACHINES DO MORE

egg crates, in the chrome-plated "juke boxes" coming out of Detroit.

Mr. Stevens looks for auto manufacturers to eventually design the front end of the car to give individuality to each make, thereby providing rapid and certain identification of the model.

Conceivably, he thinks, the front end of the car of tomorrow may have a directly functional air intake, patterned after jet propelled aircraft. The grille treatment would borrow on direct functionalism, he suggests, and its shape and design would satisfy the decorative phase through its chrome finish. Another possible treatment, currently favored in some European designs, he said, is the superimposing of a distinctive, centrally located, abstraction of the former radiator on the otherwise streamlined sheet metal mass.

Concluding his remarks, Mr. Stevens argued that a body designer's efforts should include consistant and real consideration for the passengers' comfort, safety, practicality of maintenance—and *then* styling and eye-appeal. They can be successfully integrated he said.

Studebaker has just announced the changes it is making in its "cars with the new look" which it brought out a little more than a year ago in the Commander. Front seats can be adjusted to give resiliency desired by the occupant. Foam rubber becomes standard equipment in both front and rear seats of all closed models. The grilles have been redesigned as well as front bumpers and bumper guards. There have been some minor changes in the chassis to assure easier steering and greater stability on curves.

The Studebaker Champion will also feature "personalized" front seat cushioning. Grilles and front and rear bumpers have been changed slightly as well as instrument panels and hood ornamentation.

STUDEBAKER'S tailor-made front seat is accomplished by inserting compact, wrapped auxiliary spring coils in the "pockets" of the reengineered cushions, it is reported. It is understood that the auxiliary springs can be installed either in the driver's seating area alone or under the entire front seat.

Studebaker is now producing both Champion and Commander convertibles. These models were introduced near the end of the 1947 run and only a few hundred were assembled, according to company sources.

There has been some relocation of the Studebaker powerplant and seats are placed farther forward on the frame to cradle passengers between the axles, according to Studebaker engineers. Rear shock absorbers have been repositioned to reduce any tendency of body weight to shift sideways on curves. New needle bearings have been installed in the steering knuckles.

Studebaker's rotary door latches and variable-ratio steering are available in the new cars. Overdrive is available in both series.

Federal Court Allows West Coast Purchase

New York

• • • **Judge Rodney of** the U. S. District Court at Wilmington, Del., dismissed the complaint filed several months ago by the Dept. of Justice against U. S. Steel Corp., its West Coast subsidiary, Columbia Steel Co., and Consolidated Steel Corp. of Los Angeles. The complaint had charged that the proposed acquisition by Columbia Steel of the assets and business of Consolidated would be in violation of the Anti-Trust Laws. The decision rendered by the U. S. District Court holds:

(1) That acquisition by Columbia Steel of the steel fabricating business of Consolidated Steel will not unreasonably restrain trade in rolled steel products or in fabricated steel products.

(2) This acquisition will not tend to create a monopoly.

(3) There is no evidence in the case of a monopoly.

(4) The defendants are entitled to a judgment dismissing the complaint on the merits.

New Rolling Mill Planned

Vancouver, B. C.

• • • **Plans have been** completed whereby a steel rolling mill with a rated capacity of 20,000 tons annually will be ready for production early in 1948. The new plant will be located here and will be the first of its type in British Columbia. Raw materials for the proposed plant will be scrap iron and steel, from which will be rolled steel rods and shapes. It is stated that the 12-in. mill will be capable of rolling rods from ⅜ to 1¾ in., both in rounds and squares, and also will turn out small angles, channels, I-beams, reinforcing steel and light rails.

The new industry will be eligible for the government bounty which was announced a number of years ago to encourage a steel industry in British Columbia.

JUST A HOLE IN THE LINE: ***Only a slight gap was evident in Studebaker's production line when the company changed over recently from 1947 to 1948 models. In the foreground is the last of the 1947 models which Studebaker introduced 18 months ago. Far down the line come the 1948's. Details of the new car will be announced to the public Nov. 15.***

Washington . . . EUGENE J. HARDY

• Steel is key to all price control, says OPA study . . . Wartime experience further illustrates importance of iron and steel in efforts to control economy . . . Partial control cannot work, according to report.

WASHINGTON — Price controls on steel products formed the hub around which all wartime stabilization efforts revolved, according to a recently released OPA historical study. Long the bellwether of the American economy, steel played an equally important part during the war years in fixing OPA price patterns. Once a pattern was established for steel OPA quickly adapted it as a base for all other industrial pricing policies.

Another obvious conclusion to be drawn from the study is the fact that any price control effort, partial or otherwise, is doomed to failure unless wages and production are also rigidly controlled. This truism is either being overlooked by administration planners now discussing piecemeal allocations and price controls or being held as ammunition for extension of control once their foot is in the door.

Other major revelations contained in the document entitled "Studies in Industrial Price Control" include: The frequent overruling of operating officials by the Price Administrator in regard to price increase decisions; the conflicts within the various stabilization agencies on policy questions involving steel prices and wages; and the importance placed by OPA on the views of the steel industry regarding policies affecting all industry.

OPA also freely admits that the steel wage settlement of February 1946 which resulted in an increase of $5 per ton was the "retreat from Moscow" insofar as the future of price control was concerned.

On iron and steel scrap, OPA found that its biggest problem was in the realm of enforcement. Pig iron pricing resolved itself into a problem of reconciling the views of agencies desiring to increase output of merchant iron and those of OPA. Indirect price increases, in the form of subsidies, were high on the list of remedies for the pig iron muddle.

Considerable difficulty in controlling iron ore is admitted by OPA, but, in general, the problems were handled expeditiously due to the close control of supply in the market for iron ore. The major problem was one keeping underground mines going by means of price inducements without providing a "windfall" for the entire industry.

Price control on gray iron castings is one part of the stabilization picture that OPA would like to forget. "The best that one can say about gray iron castings price stabilization," according to OPA, "is that it could have been worse."

The fact that prices on gray iron castings were higher than had been intended after 2 years of operation is laid to: (1) The difficulties experienced with every regulation which contained a combination of freeze and formula pricing but did not "freeze" a sufficiently large proportion of the work; and (2) pattern migration.

Pointing out that relations between the industry and OPA were anything but good, the study states that "price control did have an important and perhaps lasting result —it made the industry cost conscious, particularly in the case of small foundries."

In spite of inevitable troubles, OPA views the steel price program as having been "generally successful." Pointing out that the threat of a steel price increase at a time when the industry was enjoying high profits led to the freezing of prices in April 1941, the study says that this move was important for two reasons: (1) It forestalled price increases all along the line, and (2) acceptance of the freeze by the industry made it easier to obtain the cooperation of industry in the extension of price control to other areas.

THE greater part of the price increases under price control is laid to the extra provisions of the OPA regulations, due to the original negative approach and faulty administration. Although pressures against the level of steel price ceilings had appeared in the early years of price control, OPA says that it was not until the end of 1943 that they became sufficiently strong to influence the course of events in Washington.

Beginning with the decline in industry earnings in 1943, OPA states that "from that point on until the end of price control in 1946, industry was on the offensive and OPA on the defensive on the question of the level of steel prices." At this point, the problem of the nonintegrated mills, which caused considerable difficulty, also began to show signs of acuteness.

The National War Labor Board's decision on basic steel, released on Nov. 25, 1944, marked the beginning of accelerated pressure for steel price increases which OPA found increasingly difficult to resist. OPA's chief gripe in this instance was the fact that NWLB had announced its wage decision without emphasizing that the award was dependent on the approval of the Office of Economic Stabilization. Finally, OPA reluctantly recommended approval to OES and in January 1945 awarded the industry certain interim price increases.

THE interim increase "served its purpose," according to the study, giving OPA sufficient time to work out the completed product standard for steel mill products,

based on the detailed survey covering the first 9 months of 1944.

It was not until November 1945, however, that a new policy on steel price increases appeared. The operating branch accordingly proposed a program for a small price increase, $2 a ton, based on financial forecasts of the industry for the last two quarters of 1945. The proposal was rejected by Price Administrator Bowles.

The study then goes to relate that the second memorandum to Mr. Bowles from the Deputy Administrator for Price underscored the need for immediate action, but Mr. Bowles was "firmly of the opinion that the outlook for the steel companies was bound to improve as the reconversion program turned the corner, and that the fall of 1945 would be a particularly unhappy choice of time for changes in the level of steel ceilings."

The counter argument within OPA leaned very heavily upon the legal objections to taking anticipatory price action; on the reasoning that taking such action might set a precedent which would open the door to a series of additional price increases; and on Mr. Bowles summary objection that "steel isn't peanuts." So again the industry was turned down.

THIS situation continued until the steel strike of early 1946, when the steel industry made direct contact with John W. Snyder of OWMR, to which both OES and OPA were subordinate. While OPA stood pat on its recommendation of a $2 to $2.50 per ton price increase, the situation was out of its hands and the $5 per ton increase announced. This situation was regarded by OPA "as the inevitable result of an appeasement program not of its own making."

With the wage absorption policy in steel broken, OPA then began applying the new policy to all industries and also began a program of decontrol, commodity by commodity. In the fall of 1946, the General Steel Mill Products Advisory Committee asked for complete decontrol of steel mill products. At that time, however, chief attention of OPA in its consultations with the industry was focused not on questions of decontrol, but rather on some large questions concerning the application of the new product pricing standard included in the Price Control Extension Act of 1946.

THE BULL OF THE WOODS — BY J. R. WILLIAMS

The steel industry was kept fully informed of the progress made on the development of a procedural regulation to apply the new standard and the "chief solicitor of the U. S. Steel Corp. played a leading part in suggesting changes in the order as originally drafted." The order was issued on Sept. 17, but the end of price control was in sight.

OPA states that the late summer and fall (1946) were characterized by a general tendency on the part of the industry "to withhold supplies in anticipation of decontrol," which came on Nov. 11.

ALSO included in the study are rather lengthy discussions of specific difficulties that arose from time to time, for example, the low-end problem. This problem should have been met by the production agencies of the government, according to OPA.

Pressure from steel consumers for price increases on shortage items also provided many headaches for OPA. In this regard, OPA felt "that important production agencies of the government tended, it appeared, to channel industry pressures of this type towards OPA rather than to help OPA to fend them off or, even better, to help OPA meet the situation without resort to price increases." OPA, accordingly recommended to CPA shortly after the 1946 price increase reinstitution of certain production controls, which did not materialize in a practical sense.

In some instances, however, OPA admits that it was forced to grant price increases for certain products in order to remove impediments to production. The $10 per ton increase on nails (June 1946) is an example. This action was probably the most heavily argued supply action in the annals of steel price control, OPA opposing to the bitter end based on the premise that in prewar times nail production had been either a loss item or a very low-profit item.

Tracing the history of price control on iron and steel scrap from its inception in April 1941, the OPA study clearly outlines the inforcement difficulties. The study baldly states that efforts of Price Administrator Leon Henderson to bring about an antitrust investigation of the scrap industry in August 1941 "proved unfortunate in some re-

(CONTINUED ON PAGE 161)

West Coast . . .

ROBERT T. REINHARDT

• Boeing search for manpower reminiscent of war period . . . Magnesium reels for steel cable and electrical conduit may afford economies . . . Kaiser's rich Eagle Mountain ores threatened by suit.

SEATTLE—You are reminded of the hectic days of the War Manpower Commission and the ubiquitous labor expediter as you scan the four-column display advertisements of Boeing Aircraft Co. in the local newspapers which are headed "1000 men Wanted" and go on to tell about the opportunities in the aircraft field.

Boeing already has approximately 16,000 men and women on its local payroll and is hoping to get another 1000 before the end of the year to produce the 133 B-50's (Army bombers); 56 Stratocruisers; and 10 Stratofreighters for the Army; for which contracts have been announced. It is known that these contracts do not constitute the entire backlog of the company but details on other aircraft have not been officially released.

Boeing is definitely big business in this area. Seattle boasts of 212,000 persons engaged in manufacturing out of its total population of approximately 570,000. Of these, 8 pct are already employed at Boeing, making it by far the largest single employer in the Pacific Northwest.

This high rate of production is more than interesting to Aluminum Co. of America, Reynolds Metals Co. and the Permanente Metals Corp., as the present contracts will utilize approximately 1160 tons of extrusions and 2500 tons of sheet.

The current high production rate doesn't affect the financial report covering the first 9 months of 1947 which was released yesterday. This statement showed that Boeing Airplane Co. and its subsidiary, Boeing Aircraft Co. sustained a consolidated net loss of $356,528 for that period. It is expected that deliveries of B-50's and other aircraft this quarter will considerably alter the year end position of the company.

Only a mile or so from where the B-50's and Stratocruisers are being put together, another "aircraft" is going through "birth pains." The Hoppi-Copter, illustrated several months ago in THE IRON AGE, and capable of carrying only one person, is being developed. One unit of this unique flying machine has been produced and tested only indoors, but its inventor, Horace T. Pentecost, is going ahead with production of two more units and preparing for outdoor tests. Stockholders in the company are now being offered a program of refinancing designed to raise $100,000 capital and the hope has been expressed that after completion of the outdoor flight tests an eastern syndicate will step in and underwrite further capitalization for commercial production.

MORLEY & ASSOCIATES, which has for some time been in the picture as a bidder for the magnesium plant near Mead, Wash., is continuing its development of magnesium shipping reel for steel cable and electrical conduits to replace the conventional wood reels.

James C. Morley, president, reports that one 5 ft diam reel has had the equivalent of 2 years of service and has made a very creditable showing. Present plans call for the production of 36 additional reels which will be put into service by cooperating cable manufacturers to determine their ability to withstand wear and tear.

The reels are so designed as to permit their being taken apart and shipped back to the cable manufacturers in nested form with considerable savings in freight, according to Mr. Morley. He points out that with standard wood reels only about 14 can be placed in a freight car and that with the collapsible reel at least 100 can be shipped in one car.

The 5 ft diam reel now out on test weighs 220 lb as compared to 650 lb for a wood reel and 380 lb for a steel reel of the same size. Mr. Morley states that magnesium is the ideal material for this purpose and that it is far superior to aluminum. If the reels were made of this material they would have to be cast in such a manner as to approximate the weight of a steel reel, would have lower shock resistance and the price would ultimately be higher than that for magnesium reels. He said that his oganization contemplates producing these reels at a cost of about 50¢ per lb.

There are approximately 84 manufacturers of wire rope and electrical conduit in the country who utilize this type of shipping reel. Mr. Morley states that 32 of these represent approximately 80 pct of all the business. Because of the wear and tear on shipping reels these companies have an inventory loss of approximately $32 million per year. It is his contention that with the longer-lived magnesium reel this loss will be greatly reduced and even eliminated if his plan for a rental or lease pool is developed.

Extensive market studies have been made by Mr. Morley and his associates during the past 2 years. He has secured the support of cable manufacturers, state development men and financiers. A local foundry is to be established here this month for production of the additional 36 test reels which will utilize improvements in permanent mold casting of magnesium, according to Mr. Morley. He claims that his organization will be in a position to produce such castings of industrial grade for about 60¢ per lb. Work is now in progress on these molds. If everything proceeds according to plan

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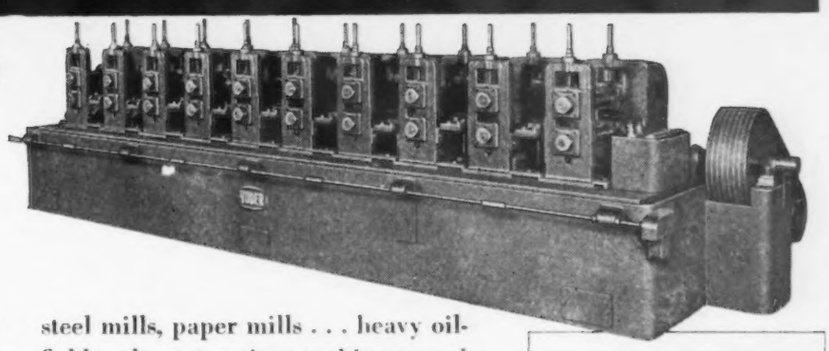
FOR ALL TYPES OF BALL AND ROLLER BEARINGS 4" BORE TO 120" OUTSIDE DIAMETER

Smooth rolling for Yoder Roll Formers

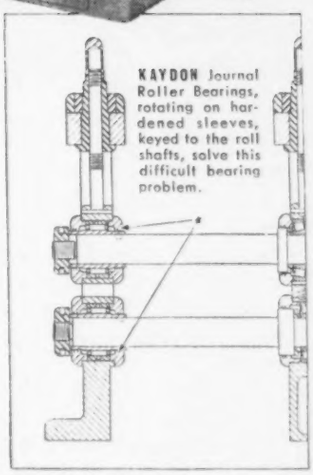


IT'S a rugged business these Yoder Roll Forming Machines are in! They take flat, heavy gauge metal strips and form them into modern moldings, tubular and angular shapes. Under the terrific loads required in the forming operations, roll shafts must operate smoothly. This calls for precision bearings of extreme ruggedness. Husky **KAYDON** Journal Roller Bearings meet these requirements.

In many types of heavy-duty machinery for metal working industries, steel mills, paper mills . . . heavy oil-field and construction machinery, and similar equipment, **KAYDON** is helping engineers to improve performance thru advanced bearing applications.

* * *

Counsel in confidence with **KAYDON**. Capacity now available for all sizes and types of **KAYDON** bearings . . . and for atmospheric controlled heat treating, precision heat treating, salt-bath and sub-zero conditioning and treatment, microscopy, physical testing and metallurgical laboratory services.



KAYDON *Types of Standard or Special Bearings:*
Spherical Roller · Taper Roller
Ball Radial · Ball Thrust
Roller Radial · Roller Thrust

THE KAYDON ENGINEERING CORP.

MUSKEGON · MICHIGAN

the magnesium castings will be the world's largest produced in permanent molds.

Morley & Associates had bid on the magnesium plant near Mead offered for sale by WAA under Section 19, but, when announced as successful bidders, they failed to consummate the deal. The explanation for this renegging as given by Mr. Morley was that it was still necessary to prove beyond all doubt to potential financial backers that the magnesium reel was practical and economically advantageous.

Mr. Morley, who has had experience in magnesium production and sales with the Permanente Metals Corp., states that he is convinced that this metal can be produced at Mead for approximately 18¢ per lb at 100 pct operation and for approximately 20¢ per lb at 50 pct operation. He is aware of the fact that Dow Chemical Co. is producing magnesium at a cost of about 11¢ per lb. When the Mead plant closed it was producing magnesium at 19.40¢ per lb.

SINCE the Mead plant is under Section 19 requiring the occupant to pledge its return to the government in the same operating condition in which it was purchased, there is considerable reason to believe that further offers by WAA will not attract too many bidders. This plant uses the ferrosilicon production, but on a larger scale than was applied at Manteca, Calif. The dismantling of its furnaces and ultimate restoration for magnesium production stand as nebulous barriers to any entrepreneur.

A further obstacle to the commercial utilization of the Mead magnesium plant is the current electrical power shortage which poses a threat to anyone hoping to maintain a constant level of production.

It is known that Mead could produce at capacity approximately 24,000 tons per year and that Mr. Morley estimates that the national requirements for reels alone would be 18,000 tons per year.

If Morley & Associates loses the Mead plant to some other more venturesome bidder, this company has the blessing of Dow Chemical Co., eager to avoid the charge of monopoly, and could thus secure its magnesium from that source. If the entrepreneur does get the Mead plant, it is understood that Dow would still be a supporter because of the distaste of Tom Clark and his cohorts for monopolistic tendencies whether aggressively fostered or through circumstance.

James C. Morley is president of Morley & Associates; Arthur L. Atherton of Atherton Construction Co. is vice-president; and Paul Bliven is attorney and financial adviser.

Steel producers in this area, while not oblivious to the threat of light metals, are going merrily on their way turning out steel to the limit of their capacity, and were complacently contemplating only a moderate price increase for scrap which would reflect eastern prices. However, a local independent producer faced with a large export commitment for ingots, upset the market to the point where scrap prices rose to an unprecedented high.

LOS ANGELES—Whether the estimated 100 million tons of iron ore in the Eagle Mountain of Riverside County, Calif., are worth $1,132,811.35, the price which the Kaiser Co. agreed to pay to E. T. Foley in April 1946 for assignment of his majority interest, or whether it should have been $3,391,000.00, the price which Mr. Foley originally set based on expert appraisal and valuation by Roberts & Crage, mining engineers, or whether the proper value is $9,329,720.00, the figure set by Harlan H. Bradt and the Riverside Iron & Steel Corp., holders of a 25 pct undivided interest in the lease and sale agreement, are all at issue in litigation pending in the California Superior Court at Los Angeles and set for trial Nov. 19.

On Nov. 3, Mr. Bradt secured permission of the court to file a cross complaint against the Kaiser Co., Inc., supplementing the cross complaint already filed against E. T. Foley. Mr. Bradt and the Riverside Iron & Steel Co. now seek to recover $2,332,430.00 for their 25 pct undivided interest in the lease hold which they contend has a total value of $9,329,720.00. Previously, Mr. Foley had filed the original suit against Mr. Bradt and the Riverside Corp. to obtain court approval of his sale of the lease hold to Kaiser Co., Inc.

In the cross complaint just filed against the Kaiser interests, it is alleged that Mr. Foley was "intimidated, menaced and coerced into a position wherein he was unable to deal freely with the Kaiser Co. on fair and even terms and was influenced and induced without the knowledge or consent of the Riverside Corp. or Mr. Bradt to enter into the sale for the 'wholly inadequate and unfair figure.'" It is further alleged that the sale was consummated by Mr. Foley without consultation with Mr. Bradt, as provided by an agreement between them and that the Kaiser Co. knew of the agreement and are therefore jointly concerned.

Although the Kaiser title to the Iron Chief mine and Eagle Mountain ores does not appear to be completely clear, as evidenced by the pending litigation, a railroad grade is being run into the area and development is in progress toward mining and shipping of this high grade ore to the Fontana mill.

Blaw-Knox Gets L.A. Job

Pittsburgh

• • • **The Power Piping Div.,** Blaw-Knox Co., has received a contract from the city of Los Angeles for the supply and installation of all piping to be used in three new high-pressure steam turbine electrical generating units.

The piping award amounts to approximately $1,250,000, and is a follow-up to piping contracts awarded Blaw-Knox Co. in 1941 and 1946 for the first two high-pressure steam turbine units ordered by Los Angeles.

Each of the three new turbines will be of 75,000 kw rating and each boiler unit will have a capacity of 825,000 lb of steam per hr. Alloy steel piping will be used to accommodate operating pressures of 900 to 1050 psi and steam temperature of 915° F.

The project indicates a sizable extension by Los Angeles in its program of developing modern steam turbine generating capacity and will reduce its dependence on hydro-power.

IF YOU MACHINE STAINLESS STEELS...

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"Machining of Stainless Steels" is a practical new operating manual based on the experiences of Armco engineers and service men in machine shops all over the country. You can get your copy of this valuable 38-page book by mailing the coupon on this page.

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Correct clearances and angles for various tools are described in detail, with sketches that give actual working information on turning, milling and threading.

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To put this useful manual to work for you just fill in and mail the coupon on this page. Meanwhile, if you need ARMCO Stainless Steel bars, wire, plates, sheets or strip, you can get quick delivery by writing The American Rolling Mill Company, 4062 Curtis Street, Middletown, Ohio. Or get in touch with your nearest ARMCO Stainless Distributor.

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Help keep steel flowing from the mills by turning in your scrap promptly. The need is critical—the shortage *greater* than during the war.

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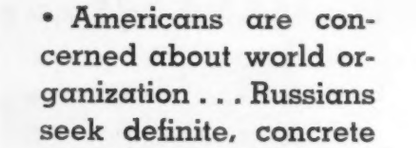
European Letter . . .

• Americans are concerned about world organization . . . Russians seek definite, concrete objectives . . . Keys to living diplomatically in the same world with Russia are patience and unstinted hospitality, according to Byrnes.



LONDON — The sensation caused by the recommendations for future American policy in Mr. James Byrnes' book "Speaking Frankly" has diverted attention from the historical record which the book contains. It is nevertheless the historical record which gives the book its main interest and importance. Mr. Byrnes is out of office and "elder statesmen" do not count for much in the United States in the making of policy; it is the more unfortunate that his suggestion of an ultimate use of force should have so conveniently provided a text for Mr. Vyshinsky's charges of "warmongering" in the Western democracies.

But Mr. Byrnes was behind the scenes in the series of momentous diplomatic episodes from the Yalta Conference in February 1945, to the completion of the peace treaties with the Axis satellites in December 1946. Retiring statesmen seldom bring out their memoirs so quickly after their withdrawal from active politics, and though sometimes Mr. Byrnes' frankness is a little too indiscreet, we cannot but be grateful to him for providing so soon a volume of first-hand testimony on what went on in the conclaves of the mighty during those critical recent months.

It is all past now, but the *post mortem* is of no merely academic interest; the study of this experience should provide a key to understanding and practical wisdom in the time ahead. Mr. Byrnes has departed from the stage, but we still have to negotiate with Mr. Molotov.

Mr. Brynes' chapter on the Yalta Conference is entitled "High Tide of Big Three Unity." The subsequent history of Big Three relations was destined to be a story of deterioration from the point. But some deterioration was only to be expected, for Yalta was the last of the great wartime conferences and the tendency of victorious coalitions to fall asunder after the end of the hostilities which brought them together is so normal a phenomenon of history that it really should not have occasioned great astonishment in the year 1945.

THE risks of the emergence from war were recognized by Allied leaders and it was Stalin himself who said in giving a toast at Yalta: "It is not so difficult to keep unity in time of war since there is a joint aim to defeat the common enemy, which is clear to everyone. The difficult task will come after the war when diverse interests tend to divide the Allies." These words were indeed prophetic, and Mr. Byrnes—at least in his own estimation — improved on them at the Christmas Eve dinner for the Foreign Ministers in Moscow 10 months later with the epigram "Whom war hath joined together, let not peace put asunder" —a stroke of wit which, he has to admit, the Russians owing to their imperfect acquaintance with Holy Writ failed to appreciate.

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The decline in cooperativeness which actually took place appeared to the public in Western countries more abrupt and catastrophic than it really was because of the extraordinary structure of humbug and make-believe created by Allied wartime propaganda. But at least after the Yalta and Potsdam conferences it was possible to make a good show of agreement and to make light of the differences which remained unresolved.

But after the breakdown of the Foreign Ministers' Conference in London in September 1945, it was no longer possible to pretend that all was well; it was necessary to tell the people. Mr. Byrnes broadcast on his return to the United States and found the popular response "gratifying." He relates that he then "decided that hereafter the people would have to be more fully informed if we were to maintain a firm position in international affairs with full public support." But fully informing the people in order to get their support had its disadvantages; it certainly did not make for the relaxation of tension.

On the contrary, the transfer of intractable disputes from secret conclave to open forum has put the world in an uproar in which all the diplomatic decencies have gone by the board; the public exchange of insults has been added to the irritations of bargaining behind closed doors. The world now lives under the sign of open disagreements openly arrived at.

ONE of the effects of turning the spotlight of publicity on international negotiations is the exaggeration of ideological issues. One of the most striking features of Mr. Byrnes' record is the almost complete absence in the nonpublic gatherings of the Allied leaders of anything that can really be called an ideological conflict, at any rate on the Russian side.

As far as the actual subjects of dispute are concerned, the great struggle of socialism and capitalism, which is supposed to be the central issue of our age, might never have existed. In the pages of Mr. Byrnes' book it is only too easy to forget what century we are in; the diplomatic historian is haunted by the feeling, "I have been here before."

It is true that there are a few changes in the political landscape, but most of the old familiar landmarks remain, and the Russians in particular like doing things in the traditional way. There may have been an economic and social revolution in Russia, but for thinking about the Dardanelles the style is Nicholas I or Catherine the Great. In these last years the Russian representatives have continually been seeking definite, concrete objectives—annexations of territory.

political control of certain countries, particular strategic bases, material goods ranging from machine tool plant to household silver. It is the Americans, not the Russians, who have been concerned about world organization, abstract principles of universal application, the rights of nations and global economy.

THIS difference of approach has been one of the main causes of difficulty in adjustment of relations; aims have been too incommensurate for successful horsetrading. Mr. Byrnes states that the "chief objective" of the American delegation at Yalta was "to secure agreement on the Dumbarton Oaks proposals for the creation of an international peace organization," but that he was "deeply disturbed" to find that Marshall Stalin was so little interested in the matter that he had not even read the American proposal on voting which had been sent to him 63 days previously. The Soviet concern was about frontiers, the composition of the governments of Poland and Rumania, and getting a strategic foothold in the Mediterranean.

It was no doubt largely because the Allied leaders were talking about different things that there was so much misunderstanding about the "Declaration on Liberated Territories," which was accepted by Marshall Stalin at Yalta almost without discussion. The Russians were apparently unable to imagine how anyone could take it seriously; it appeared to them merely a face-saving formula for American acquiescence in the partition of Eastern Europe into spheres of influence, on which an understanding had already been reached between Marshall Stalin and Mr. Churchill.

When the Americans, basing their policy on the Declaration, protested against the Vyshinsky coup d'etat which put M. Groza in power in Rumania, the Kremlin regarded it as a double cross. Mr. Byrnes confirms in his book that the Rumanian question was the main stumbling block on which Big Three unity broke down.

The issue was already acute before President Roosevelt died and in London in September of the same year, 1945, the Anglo-American demand for fulfillment of the "Yalta pledge" and refusal to recognize the Russian promoted governments of Rumania and Bulgaria caused the Conference of Foreign Ministers to break up without even a protocol on points of agreement. The deadlock then reached was subsequently broken, but nothing like "unity" has ever been restored.

TO establish good working diplomatic relations Americans and Russians have to overcome differences of mental habit and outlook which have very little to do with Communism or anti-Communism. American dislike of the "Byzantinism" of Russian diplomatic technique long antedates the Bolshevik era.

If one may draw a moral from Mr. Byrnes' pages it is that the keys to living diplomatically in the same world with Russia are patience and unstinted hospitality. The latter is far more important than is commonly imagined. Whatever hard things he has to say about Mr. Molotov, Mr. Byrnes pays tribute without reserve to the qualities of the Russians as hosts whenever conferences have been in their territory.

There is still in some quarters an idea that the way to get on with the Bolsheviks is by a squalid informality. Nothing could be further from the truth. The Russians like magnificence, pageantry, the circumstance of power and the lavish hospitality which they themselves provide; they believe that, whatever their disputes, princes should know how to entertain one another. Instead of studying ways and means for making diplomacy more plebeian, the Foreign Office would be better employed in finding out what was done at the Field of the Cloth of Gold.

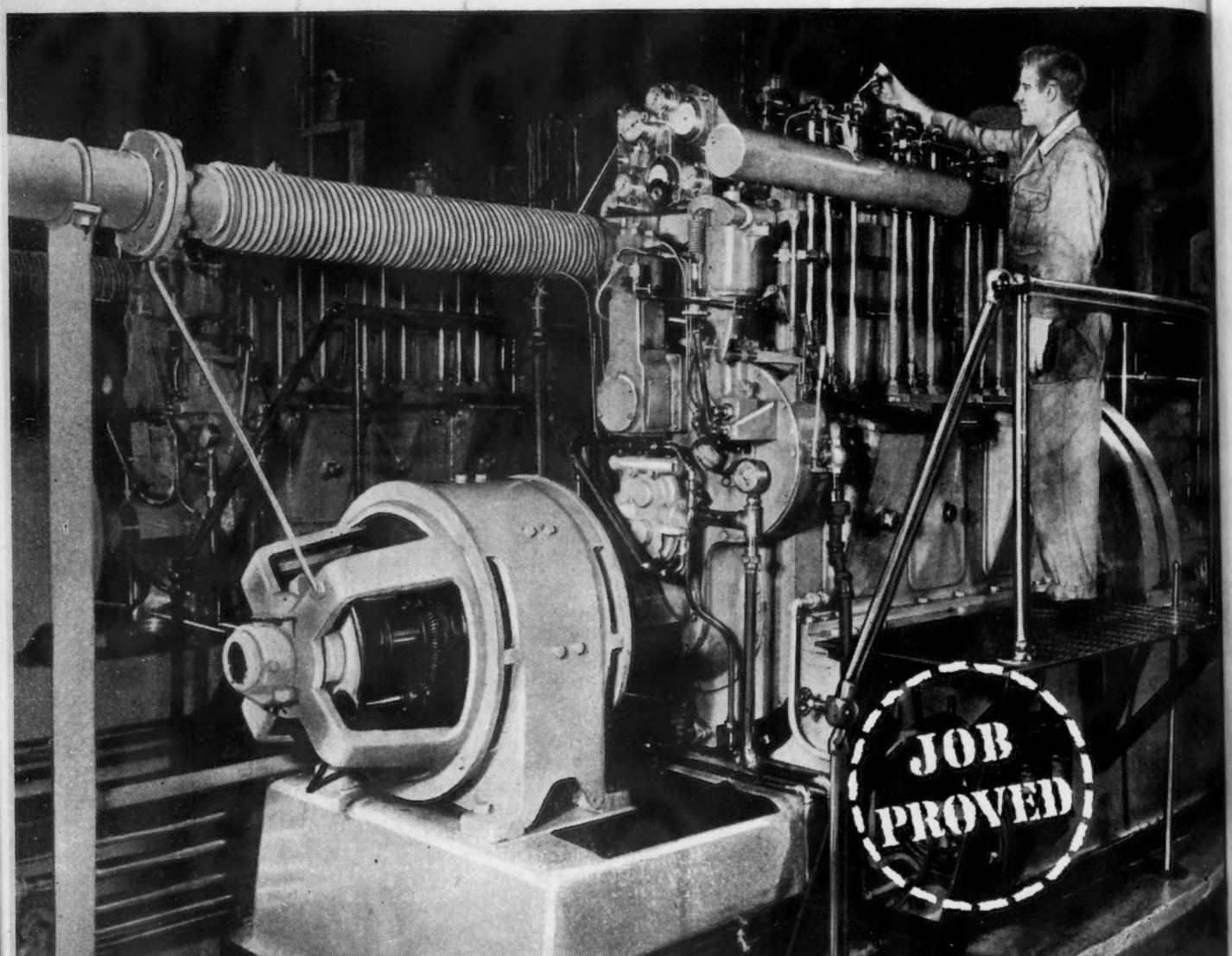
The diplomacy of sovereign states is the pursuit of war by other means; in order that the means may remain other than war and the all-too-human participants may not lose their balance from the nervous strain, it is always good that the tensions should be offset by amenities of civilized life at a standard appropriate for the representatives of great nations.

Patience comes more easily when supported by a degree of ritual and Mr. Byrnes makes it clear that for negotiation with the Russians patience should be the first and greatest commandment. Hurry and the craving for quick results are the greatest weaknesses of the Anglo-Saxon and especially of the American in negotiating with the Russian; in a test of endurance the hustler loses and is only too apt then to lose his temper instead of blaming his own failure of nerve.

Mr. Byrnes himself recognizes the virtue of patience better than he practices it; he has not always been able to bear frustration. Yet he admits from his experience that when the Russians in conference "conclude that they have exhausted their bargaining efforts, that further delay will result in no further concessions and they might as well agree, the Russians suffer no embarrassment whatever in changing their position."

REBUILDING WITH RUBBLE: *The limitless stockpiles of rubble in Western Germany provide the raw material source for a new brick industry. The rubble is ground, mixed with cement and compressed in forms. The finished product resembles a cinder block. Work in this Frankfort Am Main plant progresses in the open, although a building to house the plant is under construction.*

Two Years Without Repairs, Replacement or Overhaul



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Keeps Two Diesels in Perfect Condition and Puts an End to Frequent Overhauls

A municipal plant which uses two 125-horsepower Diesels for pumping was confronted with a serious lubrication problem. Oil was forming sludge with the result that frequent shutdowns and overhauls were necessary.

A Sun Engineer was called in and after careful analysis recommended a Sun "Job Proved" oil specially refined to stand up under the particular operating conditions.

With Sun oil in the crankcases, the engines were kept in regular service for more than two years. Sludge disappeared. Oil consumption dropped. Mechanical repairs, replacements and overhauls were reduced to practically nothing. There was no excess carbon formation.

The ability to solve problems like this is typical of "Job Proved" products and of Sun Engineers. Wherever you have a tough problem involving petroleum products, whether in power plant, machine shop, mill or factory, call your nearest Sun office or write Department IA-11

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INDUSTRIAL PRODUCTS

PERSONALS

° ° °

• **Kenneth A. Helmly** has been promoted to the position of manager of operations for Southern States Iron Roofing Co., Savannah, Ga. Mr. Helmly joined the company in 1938. In 1941 he entered military service and on his return to Southern States he entered the company's sales department. In 1945 he became assistant manager of mail order sales division, later advancing to the position of manager of that division.

• **R. S. Shoemaker** has been made manager of the Cincinnati district for the Brooks Oil Co., Cleveland. Mr. Shoemaker was formerly general lubrication engineer for American Rolling Mill Co., Middletown, Ohio. During his association with Armco he was in charge of lubrication at most of the company's plants. In his new position with Brooks Oil his headquarters will be in Middletown, Ohio.

• **Col. H. A. Toulmin, Jr.,** has resigned as chairman of the board and president of the Hydraulic Press Mfg. Co. of Mt. Gilead, Ohio.

• **W. W. Smith,** assistant vice-president and manager of sales, plate and shape division, Inland Steel Co., Chicago, will retire on Nov. 15. **John J. Bohnen** will become manager of sales, plate and shape division, and **Lawrence E. Chamberlain** will become assistant manager. Mr. Smith has been with Inland for 21 years. Mr. Bohnen joined Inland in 1938, prior to which time he was with the American Rolling Mill Co., and has served Inland in its Milwaukee and Chicago sales offices. Prior to his new appointment he had specialized in floor plate sales in the plate and shape division. Mr. Chamberlain has been with Inland Steel for 6 years.

• **W. R. Mau,** western sales manager of Vanadium-Alloys, and **Lynn A. Smith,** president of Lee S. Smith & Son Mfg. Co., have been elected new board members of Vanadium-Alloys Steel Co., Latrobe, Pa.

C. H. MENGE (left), vice-president in charge of sales, and F. E. McGARY (right), vice-president in charge of operations, Murray Corp. of America.

• **C. H. Menge** has been appointed vice-president in charge of sales and **F. E. McGary** has been made vice-president in charge of operations of the Murray Corp. of America, Detroit. Mr. Menge has been associated with the Murray Corp. in sales work for the past 15 years and was functioning under the title of general sales manager prior to this appointment. Mr. McGary joined the corporation in 1940 as manager of the engineering and mechanical division and was promoted to the position of operations manager in January 1947.

• **Clyde L. Hassel** has been appointed vice-president in charge of sales and engineering of the Pittsburgh Steel Foundry Corp. at Glassport, Pa., succeeding **E. S. Weidle** in the sales position, who resigned. Mr. Hassel has been connected with the corporation since 1924.

• **Charles D'W. Gibson** and **John A. Hill,** vice-presidents of Air Reduction Co., Inc., New York, have been elected directors of the company.

• **Dale W. Patrick,** of the Jones & Laughlin Steel Corp., metallurgical department, has joined the personnel of the Pittsburgh Screw & Bolt Corp., Colona Div., Pittsburgh. Mr. Patrick spent several years at both the Aliquippa and Oil City plants of Jones & Laughlin in the inspection, production, and metallurgical departments.

• **Donald L. Ande** has been appointed assistant district manager, Pittsburgh district, U. S. Steel Supply Co. Prior to his new appointment Mr. Ande served as a salesman in the company's Pittsburgh district office. Previously he was associated with Carnegie-Illinois Steel Corp., where, as supervisor of that company's packaging bureau, he established and coordinated packaging of steel on an industry-wide basis.

• **R. Louis Towne** has been appointed sales promotion manager for Rheem Mfg. Co. He will make his headquarters in New York. Mr. Towne joins Rheem from the Eastern Industries, Inc., of West Newton, Mass., where he was sales manager of the pump division.

• **L. A. Ver Bryck** has been appointed district sales manager of the Chicago office which covers the midwestern area of the Pittsburgh Steel Co. Mr. Ver Bryck has been with the company for many years. During the war he represented the company in Washington, after which he was appointed district sales manager for the New York office, serving there until last January, when he was made assistant general manager of sales, Pittsburgh.

• **Vernon L. Turner,** formerly traffic manager for Sloss-Sheffield Steel & Iron Co., Birmingham, has become associated with the George Cochran Traffic Bureau, Birmingham, as assistant traffic manager.

• **F. R. Hook** has been appointed resident manager of the Euclid, Ohio, plant of Fisher Body Div. of General Motors Corp. For the past 2 years he has been resident manager of the Hamilton, Ohio, plant. **Sidney J. Sabourin** succeeds Mr. Hook at the Hamilton plant. Mr. Sabourin has been plant superintendent of the fabricating division of the Flint, Mich., plant No. 1.

• **Lisle R. Beardslee** has resigned as secretary of General Motors Corp., Detroit. He is succeeded by **George A. Brooks.** Mr. Beardslee joined General Motors in 1920 as secretary of the executive committee. He was elected secretary of the corporation in 1938. Mr. Brooks was an assistant secretary of the corporation.

• **V. Dale Wissmiller** has been named western manager of the railway controls division, Minneapolis-Honeywell Regulator Co., Minneapolis. He will make his headquarters in Chicago. **Frank B. Conlon** has been appointed manager of the eastern zone, with headquarters in New York.

• **Robert S. Devlin** has been appointed sales representative covering the northern part of Minnesota, Wisconsin and Michigan for the General Steel Warehouse Co., Inc., Chicago.

• **Charles Carroll,** head of the body department of the purchasing office, Ford Motor Co., Dearborn, Mich., will retire after completing the purchasing program for the 1948 series of Ford cars. He will be succeeded by **James H. Barnes,** who has been assistant sales manager of the automotive division of Budd Co. since 1943. Mr. Barnes will join Ford Motor Co. Dec. 1 as assistant to Mr. Carroll.

• **William M. Lee** has joined the research and development department of the Pennsylvania Salt Mfg. Co., Philadelphia, as supervisor of the special products division. Mr. Lee had been research director of the Arabol Mfg. Co. and in 1942 the War Dept. invited him to become chief of the chemicals and plastics section of the office of the Quartermaster General.

RICHARD S. HUXTABLE, executive vice-president and general manager, Fawick Airflex Co., Inc.

• **Richard S. Huxtable** has been appointed executive vice-president and general manager of Fawick Airflex Co., Inc., Cleveland. Prior to his new appointment he was assistant to the vice-president and general manager of the Cleveland diesel engine division of General Motors Corp.

• **V. N. Hossack,** chief accountant of the American Steel & Wire Co.'s Waukegan, Ill., plant, has been appointed chief accountant of the company's two plants in Worcester, Mass. **Stanley G. Harris,** formerly assistant chief accountant at Waukegan, succeeds Mr. Hossack.

• **H. A. Bartling,** who has been assistant manager of the Allis-Chalmers Mfg. Co.'s industrial sales department, Milwaukee, is now manager of the new electronics section, which incorporates sales and engineering functions of the former rectifier section and electronic sales and engineering groups which were previously part of the control section. **L. W. Long** is now manager of the substation section, formerly known as the mixed apparatus section, which he had served as sales engineer-in-charge. Named manager of the firm's motor and generator section is **R. M. Casper,** formerly engineer in charge of sales of the section. **G. W. Clothier,** who has been engineer in charge of transformer sales, has been appointed manager of the transformer section. **Arch J. Cooper** has been appointed regional manager of the fifth region for the field organization of the Allis-Chalmers Mfg. Co. general machinery division. This new empire region will embrace territory now covered by New York, Buffalo, Rochester, Syracuse and Newark offices. Mr. Cooper, who has been associated with Allis-Chalmers since 1909, will continue as New York district office manager in addition to regional manager. **Vernon L. Spinney,** formerly New York petroleum sales representative, has been appointed assistant district office manager. **William J. Devers** has been named Newark district office manager, and **Ned W. Landis** has become district manager of the Syracuse office.

• **Edward C. Engle,** formerly with the diesel division of Harnischfeger Corp., has been appointed vice-president in charge of tool designing of Engineering, Inc., Milwaukee.

• **Bernard Alvarez,** formerly with the international division of the A. O. Smith Corp., has been named manager of an expanded export division of the Michael Yundt Co., Waukesha, Wis.

• **Angus B. Morse,** former assistant advertising manager of the Delta Mfg. Co., has been appointed advertising and sales promotion manager of the J. W. Speaker Corp., Milwaukee.

• **Robert B. Neuman,** former assistant advertising manager of the Nordberg Mfg. Co., Milwaukee, has resigned to accept the position of publicity and advertising director for Vapor Car Heating Co., Chicago.

• **E. F. Nason** has been appointed aircraft sales and product manager for Elastic Stop Nut Corp. of America, Union, N. J. During the past year and a half Mr. Nason has been a member of the service engineering department, where he has been active in the development of new products for aircraft.

• **Harold J. Poole** has been named manager of farm service tire sales for the B. F. Goodrich Co., Akron, Ohio. Mr. Poole had been assistant national service manager since 1943. He is succeeded in that post by **James E. Carhart,** who had been manager of the fleet maintenance department. **Ernest Hookway** has been appointed operating manager of the recently created plastic materials sales division of B. F. Goodrich. Mr. Hookway has been with the company since 1936, and for the last 2 years had been a senior development man in the industrial products division.

• **J. R. Doughty** has been named manager of the export sales department of SKF Industries, Inc., Philadelphia. He will supervise and direct all export activities in addition to his duties as manager of the sales contract department. Mr. Doughty has more than 37 years of service with the Philadelphia company.

• **Harold R. Burt,** sales and service engineer, has been engaged by Jack & Heintz Precision Industries, Inc., Cleveland, as western district sales and service representative of the electric motor and refrigeration divisions. He will maintain his headquarters in Oakland, Calif.

• **Frank A. Scott,** a director of Youngstown Sheet & Tube Co., Youngstown, for about 10 years, has resigned because of ill health. **Leon A. Beeghley,** president of Standard Slag Co. and Metal Carbides Co., Youngstown, has been elected to succeed Mr. Scott.

WILLIAM B. PROSSER, general manager, Perfect Circle Corp.

• **William B. Prosser** has been appointed general manager of the Perfect Circle Corp., Hagerstown, Ind. Mr. Prosser had been sales manager of replacement sales for the General Piston Ring Co. in 1925. When this company was absorbed by Perfect Circle in 1928, he was made manager of the Perfect Circle Tipton plant. He later became sales manager of the manufacturers' sales division. Since 1943, Mr. Prosser has been general factory manager for all Perfect Circle plants.

• **Lee S. Coulter** has been promoted to manager of the industrial sales division of American Hoist & Derrick Co., St. Paul. Mr. Coulter, an 18-year veteran with American Hoist, will direct sales and merchandising for his division through the company's sales organization.

• **Arthur Nikand** has been appointed factory manager of the Portland, Ore., plant of the Hyster Co. Mr. Nikand was first employed as a machinist at Hyster in 1934 after working in a similar position for Willamette Iron & Steel Co. for 10 years. He was appointed foreman of hoist equipment assembly in 1938, and assistant factory manager the next year, a position he filled until assuming the new position.

• **Floyd G. Sease** has been appointed an assistant general sales manager of Nash Motors Div., Nash-Kelvinator Corp., Detroit. In his new post he will share operating responsibilities with B. C. Anderson, who has been Nash Motors' assistant general sales manager for many years. Mr. Sease was formerly a special assistant to H. C. Doss, vice-president and general sales manager.

• **John F. Little** has been appointed factory manager of General Instrument Corp., Elizabeth, N. J. Mr. Little, who joined the company in 1937 as chief inspector, succeeds **T. E. Keller,** who has resigned to become vice-president in charge of operations of Florence Stove Co.

• **C. Lester Jones** has been made assistant to R. B. Rogers, president of the Indian Motocycle Co., Springfield, Mass., and will supervise production of a new light motorcycle. Mr. Jones formerly was technical assistant to the late Dr. Elmer H. Sperry of Sperry Products and during the war production manager for Sperry Gyroscope Co.

...OBITUARY...

• **Merton T. Archer,** director of research for the National Supply Co. plant at Torrance, Calif., died Oct. 26.

• **Daniel H. Meloche,** production manager and chief of engineering for the American Radiator Co., Pittsburgh, for 25 years, died recently.

• **S. Walter Batty,** 56, advertising manager of the Draper Corp., Hopedale, Mass., died Oct. 27.

• **Martin Pedersen,** 66, vice-president and one of the founders of the Specialty Brass Co., Kenosha, Wis., died recently after a short illness.

• **Elbert E. Hickok,** 72, died Oct. 9. For 44 years he had been associated with the A. Leschen & Sons Rope Co. of St. Louis.

• **Walter H. Lymburn,** 54, New England sales manager for the Hercules Cement Co., died Oct. 30.

• **Alphonse E. Thiffault,** chairman of the board of Caspers Tin Plate Co., Chicago, died Oct. 18.

• **J. Henry Arnold,** 44, general manager of the Arnold-Brown Metals & Supply Co., Birmingham, and secretary of the Southern Chapter, American Steel & Warehouse Assn., died Oct. 27.

Industrial News Summary...

- ***Marshall Plan Will Redirect Exports***
- ***No Domestic Steel Allocations Seen***
- ***Raw Material Shortages Remain***

AS the smoke clears away in Washington, it seems clear that there will not be any complete steel allocation system set up to carry out the heavy industry section of the Marshall Plan. New controls on exports will be created. But the program will be launched with the steel industry retaining control of domestic steel distribution.

The news of the individual responsibility of steel firms to produce for the European countries under the plan will take the form of "directives." Thus, an effort will be made to strike a workable balance between the easy, tragi-comic informality which has to date maimed the freight car program sponsored in Washington this year and the successive snowballing of priorities, allocations and AAA ratings which grew up during the war.

With Marshall Plan steel requirements calling for no more than 60 pct of 1947 exports for the following year, the program will be largely one of redirecting steel exports to those western European countries in the most dire need. In the first two postwar years it has been unfortunately true that those countries which needed the steel most acutely have been in the worst position to obtain it. Steel officials feel that even if the 2 million tons of steel which will be exported in 1948 above the Marshall Plan requirements were shifted to Europe, there would still be no necessity for controls on domestic allocations.

It will be painful in many cases for steel companies to turn their backs on carefully nurtured export markets in the Americas, Africa and Asia in order to expand their shipments to Europe. This about face is the only alternative to an even more embarrassing desertion of hundreds of important consumers in this country.

EXPERIENCE this year in the highly complex business of doling out steel exports, considering the acute domestic need and almost hopeless foreign requirements, indicates that exports have probably been neither too large nor too small. Keeping in mind the desperate condition of thousands of steel consumers in the U. S. and the recommendations of the Harriman Committee there is little likelihood of any expansion of the total tonnage of steel exports next year.

The case is clearly made, then, for statesman-like control of exports. But there is no evidence of the desirability of formally allocating the remainder of steel output. As the administration of the Marshall Plan progresses, there will be the danger of constant lobbying for additional controls in an effort to smooth the flow of steel to consumers in this country who are participating in the plan by shipment of machinery or manufactured products. Experience in controlled economies in Europe before the war and in the U. S. during the war taught many industrialists that there is often much to be gained by carrying on their business before a press conference in Washington in a well-modulated shriek.

Barring this kind of interference, the steel industry will remain free to do the best it can with the remainder of steel production for distribution to consumers in this country. Steel officials feel that imposed regulation of distribution at this time would only mean a complete screwing up of the steel delivery situation which makes more sense now than it did a year ago despite all the shortages.

Before the government can impose price controls on the steel industry, there must be new legislation. But there is a disposition in some government circles to obtain this authority if possible. There will be a fight to place controls on wages as well, if ceilings are to be reimposed on steel prices. It is certain that there will be an effort by the government to shackle both labor and industry in irons of "moral suasion."

WITHOUT wage controls the President would find himself with another hot potato in his hands. In 1946 he had to settle the steel price-wage mess by agreeing that wages should be increased and permitting prices to go up simultaneously. He will not wish to travel that road again. Steel companies will make every effort now to hold the line on prices just as the government will continue to avoid action in the wage-price dilemma. The next move will be Mr. Murray's on wages early next year.

In the meantime steel companies continue their fight against scrap prices. Many of the big mills actually threaten to take openhearths out of production rather than pay any higher prices for their steelmaking scrap. Their argument is that with scrap now 100 pct above OPA levels, higher prices will not bring out any additional material.

The necessity for extensive blast furnace repairs and the scarcity of cast iron scrap are dislocating the pig iron market. Thus, there is no opportunity for steel producers to sidestep the scrap scarcity by using additional tonnages of pig iron.

THE IRON AGE heavy melting steel scrap composite price remains stable this week at $41.50 a gross ton—$1.08 below the peak price reached 2 weeks ago. The production of steel ingots this week was at the rate of 97.5 pct of capacity, 1.5 pct above last week's rate. The change is believed to be a temporary variation rather than an indication of substantially improved operating conditions.

• **STEEL SHIPMENTS** — September shipments of steel products at 5,118,839 net tons brought the total for the first 9 months of 1947 to 46,620,218 tons, according to the American Iron & Steel Institute. That figure is more than the total for the 12 months of 1940. At the end of 9 months in 1947, shipments of ten classifications of steel products were higher than the amounts shipped during the full year 1946. These products included electric weld pipe and tubes, plates, steel piling, ingots and other semi-finished items, electrolytic tinplate, mechanical and pressure tubing, conduit, rolled steel car wheels, axles, and light rails. Shipments of sheet and strip during September, at 1,502,024 net tons, were higher than the 1,469,847 net tons shipped in August. On the basis of sheet and strip shipments during the first nine months of 1947, the total for the full year will set a record in the vicinity of 18 million tons.

• **PHILADELPHIA PIG IRON PRICES**—With the announcement of the agreement to sell most of the E. & G. Brooke Iron Co. pig iron to three consumers, Birdsboro pig iron prices are no longer being quoted by THE IRON AGE. On the comparison of price page, basic and No. 2 foundry iron for Philadelphia delivery will hereafter be quoted as the average prices for these grades from Bethlehem and Swedeland, Pa.

• **STEEL OUTPUT RECORD**—October output of ingot steel and steel for castings totaled 7,564,302 net tons a peacetime record, according to The American Iron & Steel Institute. The tonnage was exceeded only in ten of the 45 war months from the attack upon Pearl Harbor to V-J day.

The October total was only 300,000 tons below the wartime peak of 7,826,257 net tons, set in March 1944. Steel production for the first 10 months of 1947, at 70,188,837 net tons, topped the full-year output for 1946 and exceeded the production of any full year before 1941.

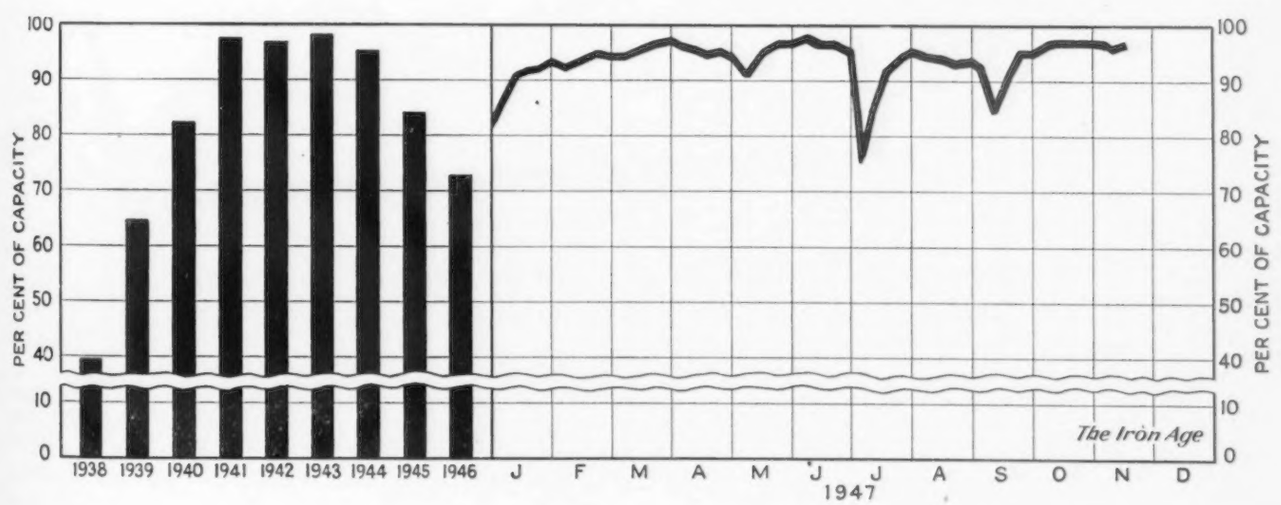
• **WIRE PRODUCTS**—Effective Nov. 1, Pittsburgh Steel Co. increased its price of standard wire nails and galvanized nails by 75¢ per keg, to $5 and $4.75 respectively. Farm and poultry fence prices were also advanced 10 base columns to 101. The company states these items could no longer be profitably produced at the former prices. It is reported that labor productivity in these departments has been declining in the past few months.

• **STEEL WAGES**—The average hourly wage rate paid to steelworkers in September 1947 set a record at $1.571, according to American Iron & Steel Institute. The high mark previously was $1.556, the average during May and August 1947. In September 1946 the average rate was $1.362. September employment of wage earners at 527,000 was about 1 pct lower than the 532,900 employed in August. The average work week for wage earners totaled 38.3 hr in September, compared with 37.1 hr in August, and 37.5 hr for September 1946. Total employment in September including wage earners and salaried workers was 618,400, compared with 625,200 employed in August and 595,700 in September 1946. Total wages for employees receiving hourly, piecework or tonnage wages amounted to $135,532,000 for September, compared with $135,778,000 in August, and $111,158,000 for September 1946. Total wages for wage earners and salaried workers amounted to $168,859,000 for September, compared with $169,075,000 in August and $139,625,600 in September 1946.

• **ITALIAN CREDITS**—Credits totaling $14.5 million have been granted five Italian iron and steel mills and additional credits totaling $22 million have been granted small industrial concerns in Italy, the Export-Import Bank says. The two credits, made available to the Institute Mobiliare Italiano, are part of a $100 million credit made by the bank in January for reactivation of Italian industry and foreign trade. The steel mill credits are designed to enable Italian mills to buy solid and liquid fuels and certain amounts of equipment in the United States. Bank officials said the increased production of Italian steel would meet "urgent Italian requirements" and would "supply materials to other Italian concerns engaged in manufacturing for foreign markets." The steel mills benefitting from the new credits should be able to produce an aggregate of well over 1 million tons of steel in 1948, the bank predicted.

• **GETTING CLOSER**—The 10,000 freight car-per-month program crept closer to its goal in October when the nation's car shops turned out 8394 units. J. Monroe Johnson, ODT director, said the total was the highest since April 1942. "The minimum 10,000 car goal can easily be reached in November," ODT said, "with continued cooperation of the steel industry, car builders and railroads."

Steel Ingot Production by Districts and Per Cent of Capacity



Week of	Pittsburgh	Chicago	Youngstown	Philadelphia	Cleveland	Buffalo	Wheeling	South	Detroit	West	Ohio River	St. Louis	East	Aggregate
November 4	103.5	96.0*	90.0	95.0	95.0*	102.0	92.0	99.0	102.5*	103.0	98.5	80.0	88.5	96.0
November 11	104.5	95.5	92.0	95.0	97.0	102.0	102.0	99.0	101.0	112.5	103.0	77.5	99.0	97.5

* Revised.

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JONES & LAUGHLIN STEEL CORPORATION

PITTSBURGH 30, PENNSYLVANIA

Warehouses Struggle With Paradox of More Customers—Less Steel

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By BILL LLOYD
Cleveland Regional Editor

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Dollar Volume Of Warehouse Business Has Increased; Mill Receipts Down

Mill Deliveries to Warehouses

	1940		1946	
	Tons Shipped to Warehouses	Pct of Total Mill Production	Tons Shipped to Warehouses	Pct of Total Mill Production
Structural Shapes	331,523	9.9	754,106	20.6
Plates	313,663	7.7	673,898	15.9
Hot Rolled Bars			987,634	15.3
Cold Finished Bars			499,736	33.3
Total	604,285	12.4	1,487,370	18.9
Seamless Tubing			840,988	45.8
Mechanical and Pressure Tubing			130,687	30.0
Hot Rolled Sheets			795,514	14.2
Hot Rolled Strip			105,874	7.6
Total	483,340	6.5	901,388	13.0
Cold Rolled Sheets			426,631	10.4
Cold Rolled Strip			45,048	3.5
Total	309,419	10.0	471,679	8.8
Coated Sheets	733,848	46.2	440,457	30.0
Grand Total	6,686,534	14.6	8,738,750	17.9
Net Increase in Tons				2,052,216
Percentage Increase in Tons				30.0
Percentage Increase in Participation				22.6

From annual report Walter S. Doxsey, Pres. American Steel Warehouse Association

Cleveland

• • • **With more customers on** the books and clamoring for shipment than at any time in their history, the major problem of the steel warehouses today is how to take care of more customers on a small tonnage, for mill receipts have been declining during the past few months.

On the basis of dollar volume, steel warehouse sales are ahead of last year's sales at this time, but increases in steel prices and not higher mill receipts are responsible for this apparent anomaly.

Numerically, steel warehouse customers have increased commensurately with a big jump in the number of steel processors and fabricators, which has advanced from approximately 20,000 to some 33,000, and reliable sources in the warehouse trade have estimated that steel warehouses are taking care of 50 pct more customers than they did before the war.

Steel warehouses are making money, and those who fabricate are probably getting more money for their steel than they ever did before; and to some segments of the industry these circumstances suggest that very happy times are ahead for the warehouse operator. On the other hand, an equal number of warehouse operators, all of whom could use two or three times the amount of steel they're getting, believe that warehouses are not going to continue to do a "big tonnage" business when competition (between each other and the mills) comes back.

It should be emphasized, however, that steel warehouses are going to hold as many of the new customers as they can, and are not going to turn them over to the mills without a battle. Thus, it seems that if mills continue their prerogative of turning orders of less than three tons away, many of these customers will stay with the warehouses.

But from the long range point of view, the new steel capacity now going in may make some of these customers attractive to the producers, and there are still purchasers who want to buy practically all their steel requirements from the mills.

Present handling costs make large orders more attractive than ever, and car-to-truck is even yet one of the keys to the steel warehouse business. But the shortage of many steel products forces warehouse operators to spread their quotas with caution.

To some observers, the steel warehouse picture is not as pretty as it looks, especially as regards the first quarter of 1948. According to reports, repairs to structural rolling units will result in a 20 pct cut in some of these items which steel warehouses will be expected to take along with all other consumers. New facilities being installed are not expected to supply any increase in warehouse quotas, but some operators may have the chance to improve their tonnage receipts by taking the greater share of their quotas in light stock. However, this may serve only to unbalance warehouse stocks still further.

Since the end of the war, where producers have allocated production largely in accordance with previously established requirements of their customers, steel warehouses have not fared too badly, but recent cutbacks in plates, shapes and sheets have some of the warehouses wondering when all this is going to end.

A predominant factor in this situation has been the action of some producers on basing points and freight absorptions and it seems fairly evident that some of these producers have a customer relations job cut out for them with some segments of the steel warehouse industry, when they are once again on the make for business.

In some areas, relationships of many years' standing between producer and warehouse were unceremoniously broken, leaving warehouse operators high and dry for a new source of supply. Some

of the more aggressive operators have not forgotten, and there is more than one individual record of tonnage receipts since V-J Day. It is not unlikely that these will be brought out at the appropriate moment to make very unhappy reading for some of the steel producers.

In general, it would appear that commitments to steel warehouses have been best kept by the major producers, who perhaps were also in the best position to afford it. But, as many warehouse operators have pointed out, referring to the mills who continue to ship, "they know the day is coming when there'll be a buyers' market in steel and don't think we'll forget either."

In some cases, shipments to warehouses have been such that the operators were forced to give up certain lines, and substitute others if possible, or even try for the modern Mecca of the steel consumer, a new source of supply.

The present abnormalities of steel supply and demand seem to have indicated to warehouses just who their friends are, and it is likely that those steel producers who can least afford it will have to undersell to get the business, if in fact they get it at all, when steel is once more in long supply.

While cold finished, alloy, stainless, and tool steels are in sufficient supply that the average steel warehouse has some latitude of movement, where these products are concerned, most steel warehouses probably cannot look forward to getting much more tonnage in flat rolled products than they have been getting, until the third quarter at the earliest, when the effect of the new steel capacity will probably first be felt.

J & L Details Plant Improvement Program; To Borrow $60 Million

Pittsburgh

• • • **Jones & Laughlin** Steel Corp. last week [*Editor: Nov. 6*] released details on its $100 million plant improvement program. In rounding up data on the program, Adm. Ben Moreell, board chairman, said that its primary purpose was improving steel quality and reducing steelmaking costs.

Actual increase of ingot capacity will be 150,000 tons annually. A major expansion in capacity was decided against at this time because of the cost involved and the priority of the present program, he declared. Of the total program outlined, some $65 million remain to be spent.

Highlights of the project as summarized by the admiral, with estimated cost and date of first operation in parenthesis, include:

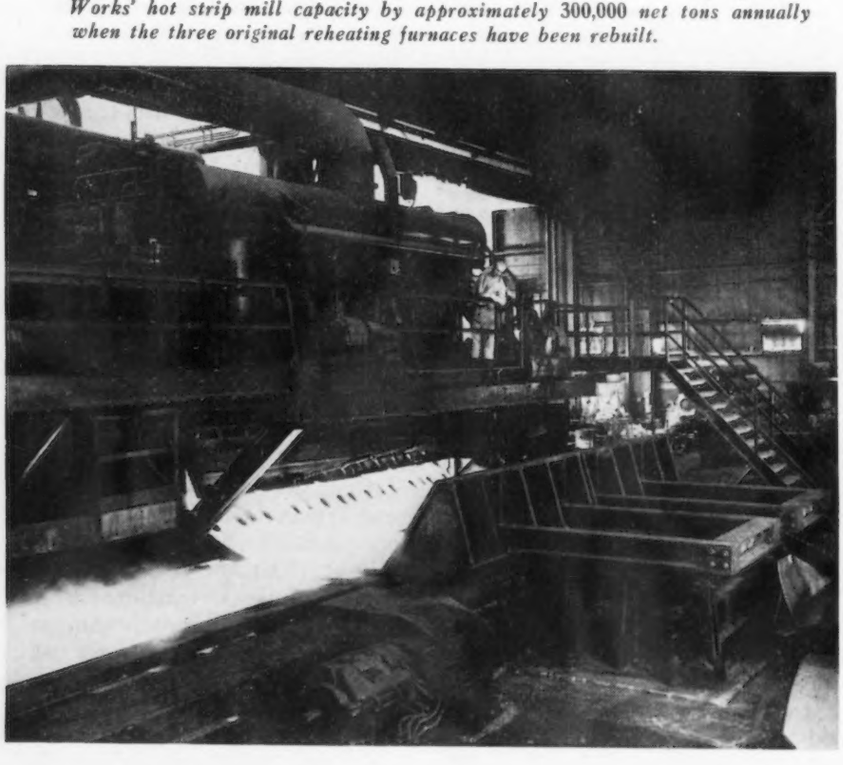
Aliquippa Works	
Five-stand tandem cold reducing mill and strip pickling line (November 1947)	$12,900,000
Rebuilding and enlarging No. 1 battery of byproduct coke ovens (May 1948)	6,989,000
Otis Works	
Additional open-hearth (June 1948)	2,000,000
Modernization of continuous hot strip-sheet mill (March 1950)	12,700,000
Consolidation of mines, washing and mechanization equipment (July 1949)	18,917,000

To help carry out this program J & L has arranged to place $60 million of first mortgage bonds with a group of life insurance companies and other large institutions.

Admiral Moreell reported that the company's labor relations were improving, wildcat strikes decreasing. "There is a friendlier and more cooperative attitude," he said. "We feel the unions should deal with us as responsible business men and our experience indicates they are doing so."

Commenting on freight rate increases on a percentage basis as they affected Pittsburgh mills, the admiral remarked that such increases were having a marked effect on J & L's distribution pattern. "We are now studying just what we can do in the face of this situation. Our study, however, is not yet complete," he asserted.

INCREASING CAPACITY: *Skidding out of the new number four reheating furnace onto U. S. Steel's Irvin Works' 80-in. hot strip mill, this 18-ft slab will be rolled into a 2,000-ft coil of steel in two minutes. This new slab heating furnace is part of an expansion program which will step up Irvin Works' hot strip mill capacity by approximately 300,000 net tons annually when the three original reheating furnaces have been rebuilt.*



Doubts U. S. Can Meet Europe's Need for Steel, Scrap, Machinery

Washington

• • • **President Truman's** Committee on Foreign Aid this week served notice on the American economy that the necessity of U. S. aid to Europe is not only economic but strategic and political. "At no time in history has there been more need for Western Europe and the U. S. to stand firmly together," the citizens committee of 19, headed by Commerce Secretary W. Averell Harriman, told Mr. Truman in its report.

This committee, charged with assessing the nation's ability to supply European needs, found that there will be little difficulty in meeting the requirements for the two major commodities—coal and grain—but raised serious doubts as to the possibility of meeting European needs for scrap, semi-finished steel, sheet and strip, tin plate, and certain types of machinery.

Revised estimates indicate that the cost to the U. S. Treasury will be $5.75 billion for the first year and $12 billion to $17 bililon for the complete program. The Paris shopping list of imports sought from the U. S. was revised downward, due primarily to unavailability of goods in the U. S.

The committee assumes that "no aid program acceptable to the American people is likely to result in the movement of any larger over-all tonnage of U. S. exports that we were shipping abroad during the second quarter of 1947 (an annual rate $12,700,000,000."

It is considered impossible for exports of finished steel products to Europe to reach anything like the Paris figure without very damaging effects on the domestic steel-consuming industries which would contribute to the general shortage of finished steel mill products.

The committee expresses doubt that the real requirements will prove to be as high as stated in the Paris report (THE IRON AGE, November 6, p. 153-B). Furthermore, it believes it may be possible to increase the supply of semifinished steel products for Europe in ways not related to the over-all size of U. S. exports.

One possibility that should not be overlooked is that of increasing

Foreign Aid Committee Makes Quota Recommendations On Marshall Plan

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shipments to Europe to the extent of any decline in shipments to other destinations. Another to be considered is that of supplying more semifinished products from Germany than presently planned.

Any expansion in the steel industry beyond that now planned certainly would not contribute much to European requirements over the next two years when their needs are most urgent, the report goes on to say.

Moreover, it continues, such an expansion would in itself absorb steel and make it more difficult for Europe to obtain needed steel-making equipment.

Washington

• • • The administration estimates the cost to the treasury of the four-year European Recovery Program at $16 to $20 billion as compared with the $12 to $17 billion estimate made by the Harriman Committee. The administration estimates were submitted to the House and Senate Foreign Affairs Committees by Secretary of State Marshall early this week.

Secretary Marshall also stated that present estimates, subject to final checks in the light of the Harriman Report, indicate that the cost for a 15 month period from April 1, 1948 to June 30, 1949 will be somewhat less than $7.5 billion. The Harriman Committee estimated the first year expenditures by the U. S. at about $5.75 billion.

He further stated that "aid should take the form of grants or loans, depending in each case upon the capacity of the particular country to repay and the effect which accumulation of additional external debt would have upon sustained recovery."

Finally, he told the congressional groups that the administration program contemplates the use of funds provided under the program for purchase of commodities outside the U. S. of commodities not readily available in sufficient quantities in this country.

The committee is aware of the expansion program now under way in the steel industry and scheduled for completion within the next year, including more than 2,500,000 tons of additional steel ingot capacity, supported by some 3,000,000 tons increase in coke capacity and 3,000,000 tons in blast furnace capacity and an additional 3,000,0000 tons increase in sheet mill capacity, together with a substantial increase in other finished products. There is no assurance, however, in the committee's opinion, that the U. S. output in the near future will be adequate to meet all the demands upon it. The committee avoided taking a stand on the long term steel expansion issue.

On specific materials, a subcommittee report written by a group headed by Hiland G. Batcheller, president of Allegheny-Ludlum Steel Corp., states that "scrap cannot be safely exported at this time." The four-year European scrap import requirement is about 8,300,000 tons. This tonnage, the subcommittee finds, represents from 8 pct in 1948 to 11 pct in 1951 of the total estimated scrap consumption of the participating nations.

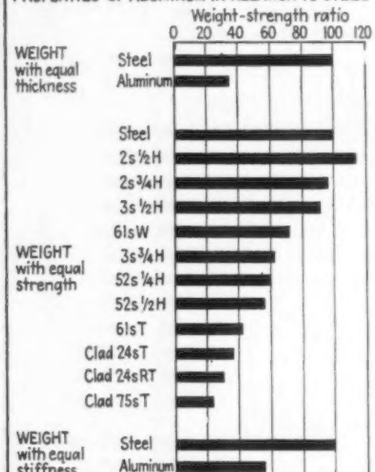
Pointing out that the domestic loss of steel due to inadequate scrap supplies is estimated at more than 3,000,000 tons or more, the subcommittee recommends that (1) the government accelerate its declaration and sale of surplus scrap; (2) scrap be returned immediately from foreign areas; and (3) scrap be purchased from any foreign countries which may have large surpluses.

This latter recommendation is probably as fatuous as was the original request from Paris that the U. S. should export 2 million tons per year, as the U. K., France, and Italy have been scouring the world for two years trying to buy any scrap available.

As to the four-year requirement of 312,000 tons of ferro manganese, the subcommittee recognizing the dependence of this country on foreign ores states that "Government authorities responsible for

(CONTINUED ON PAGE 132)

TABLE I
SUBSTITUTION GUIDE
PROPERTIES OF ALUMINUM IN RELATION TO STEEL*



*Steel-S.A.E.1020

NOTE: There is no appreciable change in stiffness or weight for the various alloys or tempers of aluminum

Above based on typical properties of aluminum and figured on a steel strength value of 56,000 psi ultimate strength

Courtesy: Permanente Products Co.

Many Industrial Applications Of Aluminum May Become Permanent

o o o

By D. I. BROWN
Chicago Regional Editor

o o o

Aluminum Challenges Prices Of Steel, But Requires Change of Technique

Chicago

• • • **Aluminum producers** report it is somewhat difficult to break down or qualify all the new applications for aluminum which have taken place in the last 6 months. Although much of the present demand is pure substitution because of sheet steel shortages, some are bonafide aluminum applications which take advantage of the properties of the metal. Regarding substitutions, most consumers report that the use of aluminum is simply a matter of economics. These fabricators who are faced with either cutting back production schedules, or using aluminum, or going into conversion deals, or buying gray market steel have found aluminum the more economical way out.

If the design of a part or the application permits substituting aluminum for steel in the same gage or thickness, aluminum will cover three times the area or go three times as far as the same tonnage of steel sheets. Table I is offered as a rough guide to consumers considering the use of aluminum in place of steel. This comparison, made by the Permanente Products Co., is based on a SAE 1020 steel at a 56,000 psi ultimate strength level.

Editor's Note: Part I of this aluminum story appeared on p. 131, THE IRON AGE, *Nov.* 6.

Part I of this story compared the price of steel and that of aluminum utility sheets. The utility sheet grade is not recommended by producers for more difficult applications. The ventilating industry employs this aluminum type almost exclusively, as do other consumers where forming, drawing or strength are not important. More exacting requirements call for other types of aluminum alloys and these grades cost more money.

Aluminum utility sheets sell for 24¢ a lb, which is equivalent to steel at 8¢ a lb. The other popular aluminum grades such as 2 and 3S, 52S and 61S in standard sizes with regular mill finish are priced from 24¢ to 33¢ per lb. Just as in steel sheets, the prices vary in aluminum with width, size, gage, temper, finish, etc. Consumers point out that with gray market steel sheets running as high as 15¢ per lb, even the most expensive of the unclad aluminum products are often cheaper to use.

In Table II the popular aluminum grades are cataloged as to strength and general usage. These grades are used on the tougher applications where the utility sheets or strip won't do the job. Generally 2S is employed where maximum workability is the chief aim. In heavy drawing or forming jobs the alloy above and to the left of line 1 is used.

Alloys between line 1 and 2 are generally used on average forming jobs. Obviously, the use of 61S-O, or the annealed heat treatable alloy, would be a waste of money unless the parts were solution heat treated after forming to take advantage of the strength of this alloy.

The alloys falling between lines 2 and 3 are being used in moderate forming jobs. The higher degree of temper makes these grades stronger and at the same time somewhat less workable than the alloys to the left of line 2.

Some consumers have taken advantage of the particular properties of heat treatable aluminum alloys. One example was cited where the consumer ordered 61S-0. The parts were formed and the sheet gage was the same as the steel gage formerly used. The customer then solution heat treated the parts at around 950°F, water quenched them and secured the strength called for by the specification.

If higher ultimate strengths had been needed the parts would merely have had to be aged at around 350°F for 6-10 hr. Table II shows the difference in strength between the two tempers just mentioned W and T.

The program of substitution is not just as simple as that of comparing prices and weights, most manufacturers told THE IRON AGE. The fabricating characteristics of the two metals are different. Although aluminum can be satisfactorily welded or joined by any standard method, the practice and equipment required is different.

A truck body builder in Chicago

stated that painting aluminum was no more difficult than steel if the prescribed instructions were followed. This plant pointed out that any good paint job on steel first required a bonderizing treatment and essentially that is all that is required on aluminum. There are cheaper methods of preparing aluminum for paint which produce excellent surfaces equal to any steel painting practice.

Aluminum engineers in the field report that one of the chief headaches in substitution is that metal fabricators want to take aluminum sheets and run them through the same drawing die setup that they used the day before on steel. In many cases the condition of the dies must be improved to satisfactorily draw aluminum, and this not only gives good results in aluminum but cleaning up the tooling has also been found to improve the drawing of the steel formerly used.

One shop man in this area summed up the entire fabricating and manufacturing story concerning substitution by saying, "If you are going to use aluminum to the best advantage, just forget that you spent 20 years in the steel sheet shop, put yourself in the hands of the aluminum engineers and answer all their questions in full, do exactly what they say and everything will turn out fine."

TABLE II

QUALITATIVE BREAKDOWN OF ALUMINUM APPLICATION BY GRADE AND PROPERTIES

Increasing strength by cold work →

Increasing strength due to analysis ↓

Typical Grade	Mechanical Properties-Y.S. at 0.2 pct offset, elongation in 2 in. gage length					
2S	For maximum workability at minimum strength					
	Temperature	0	¼H	½H	¾H	H (full)
	Ultimate strength	13,000	15,000	18,000	20,000	23,000
	Yield strength	5,000	15,000	17,000	19,000	21,000
	Elongation	35%	12%	9%	6%	5%
3S	For workability and moderate strength					
	Temperature	0	¼H	½H	¾H	H (full)
	Ultimate strength	16,000	18,000	23,000	26,000	29,000
	Yield strength	7,000	17,000	22,000	25,000	27,000
	Elongation	30%	10%	8%	5%	4%
52S	Temperature	0	¼H	½H	¾H	H (full)
	Ultimate strength	23,000	34,000	37,000	39,000	42,000
	Yield strength	12,000	27,000	31,000	33,000	36,000
	Elongation	25%	12%	10%	8%	7%
61S	Heat treatable-For higher strength with limited workability					
	Temperature	0	W	T		
	Ultimate strength	18,000	36,000	47,000		
	Yield strength	8,000	23,000	21,000		
	Elongation	22%	22%	12%		

O = Full annealed
H = Full temper
W = Solution heat treated and water quenched
T = Solution heat treated and water quenched + precipitation aged

THE IRON AGE

So far the discussion has concerned aluminum replacing steel sheets and strip of the hot and cold rolled type in ordinary quality classifications. When aluminum is considered in place of other types of steels, the story is somewhat different. For instance, the larger sellers of steel roofing declare that based on standard mill prices of both materials, aluminum roofing is at present competitive with galvanized steel. Another application is in wash tubs. The aluminum companies maintain that a deep drawn aluminum tub is as cheap overall to make as a deep drawn steel tub which must be enameled. Of course, it is admitted that in the tub application one reason aluminum can compete with steel is due to the high rejections of retreatments in the enameling operation in order to get a satisfactory coating.

In discussing the various applications of aluminum, a few seem worthy of mention as they appear to be important from a long range view.

All of the larger roofing concerns have been forced to use aluminum because of the widespread shortage of galvanized sheets. Aluminum was found more difficult to form than was galvanized. When the roofers first started to use aluminum they had to change their corrugating roll and depth of deformation in order to allow for the greater springback of the aluminum sheets. Such concerns declare that aluminum roofing, when properly installed, will make just as good a roof as galvanized steel. None of the aluminum roofs have been on long enough to tell whether or not they are superior in corrosion resistant properties over galvanized steel.

The big trouble with aluminum roofs, the roofing companies declare, is that it has been impossible to educate the farmer to install the roofs correctly. Aluminum roofs should be installed with aluminum types of nails. This is necessary to preclude the galvanic action of two dissimilar metals. Also, the farmer just can't tack aluminum sheets on stringers spaced 18 in. apart as they used to do with galvanized. The aluminum sheets over this span bulge and sag, and any good wind will take the whole roof off. However, in cases where farmers have installed roofs with a 10 in. maximum span between wood sheeting stringers, as recommended by the roofers, or on a solid wood deck, the aluminum roofs have not blown off and have given just as good service as any galvanized roof to date.

In Illinois aluminum roofing is used in 0.019 in. gage which is about equivalent to 26 gage steel sheets. This roofing costs the farmer $10 to $11 a square, which is equivalent to the steel warehouse price for galvanized roofing when figured on an area basis. Actually, 0.027 in. thickness in aluminum is the best thickness for roofing and should give the same stiffness as the steel roof. However, the farmers will not pay the $16 per square price for the heavier aluminum and the roofers are forced to market the thinner gage.

The most recent development in the aluminum roofing field has been the introduction of industrial

roofing and siding by Alcoa. This material it is reported will be sold in 0.032 in. thickness.

Many people in the roofing business believe the farmers and those other consumers who buy roofs would go back to galvanized sheets if they could get them. However, sellers of roofing are not certain that this will occur. They point out that at the moment the two materials are comparable pricewise and that as long as aluminum sheets can be delivered in the necessary tonnages faster than they could get galvanized sheets, aluminum is here to stay.

Warehousers of both materials believe that it is very possible that the narrowing price differential will continue as it has and that a year or two from now when the galvanized steel sheets may become plentiful the aluminum might conceivably be cheaper.

One large roofing concern in Chicago stated that in the past, the practice of the steel mills in supplying galvanized sheets has not helped the reputation of that material. At times, this company stated, the mills in order to sell more galvanized sheets have put on a thicker coating of zinc. At other times, depending on market conditions, the thicknesses of the zinc coating vary all over the lot. They point out that in the rural areas the life of galvanized roofing is widely different depending on how bad the steel producers wanted the business. This company did not believe that the same thing could happen in aluminum roofing.

Another roofer pointed out that immediately after the war most of the aluminum roofing was made from battlefield scrap and the sheets were clad with a pure coating. The life of these sheets may or may not prove satisfactory. Today most aluminum roofing sheets are practically pure aluminum with good corrosion resistance and do not need to be clad.

Another application in which aluminum has made a very large inroad has been in the heating and ventilating industry where the lighter material is used for duct work and also hot air furnace installations. The heating and ventilating companies contacted reported they were very well satisfied with aluminum in their application and they doubted very much if they would ever go back to galvanized steel sheets or strip.

These people use the utility grade of aluminum which they have found is easier to work, makes a better appearance, and is cheaper than using galvanized, as there is less waste when using aluminum. There are no fabricating problems, since the aluminum forms the locked seams used in duct work much easier than does steel.

The aluminum producers do not believe that their products will stay in straight passenger automobile applications. Ford Motor Co. officials have specifically said aluminum would be used only to augment and stretch the available steel supply so that more cars could be built during the steel shortage. Most people agree that an all aluminum car is remote. A car was built and tested many years ago in which aluminum comprised 85 pct of the metal used. (THE IRON AGE, Oct. 16, 1947, p. 160.) However, aluminum applications in the truck field have proved to be sound, and in any vehicle where pay load is important, it is the concensus that aluminum will continue to be used in increasingly larger tonnages.

Coming Events

Nov. 17-18 National Machine Tool Builders Assn., annual meeting, Hot Springs, Va.
Dec. 1-3 Society of Automotive Engineers, air transport meeting, Kansas City.
Dec. 1-5 American Society of Mechanical Engineers, annual meeting, Atlantic City, N. J.
Dec. 1-6 Twenty-First Exposition of Chemical Industries, New York.
Dec. 4-6 Electric Furnace Steel Committee, AIME, annual conference, Pittsburgh.
Jan. 12-16 Society of Automotive Engineers, annual meeting, Detroit.
Jan. 12-16 National Materials Handling Exposition, Cleveland.
Jan. 19-20 Institute of Scrap Iron & Steel, Inc., annual convention, Chicago.
Feb. 10-11 Pressed Metal Institute, annual meeting, Buffalo.
Feb. 15-19 American Institute of Mechanical Engineers, annual meeting, New York.
Mar. 18-19 Magnesium Assn., annual meeting, New York.

Lone Star Steel Co. Produces First Pig Iron in WAA Plant

Daingerfield, Tex.

• • • **Premium grade** pig iron from Texas was on its way to the Atlantic and Pacific seaboards following ceremonies at the Lone Star Steel Co. as the multi-million dollar war surplus plant began steady production for the first time.

The first iron was consigned to the Federal Housing Authority for use in emergency housing under terms of the three-year lease the company holds from WAA. Housing agencies will receive the full output of the plant until it reaches two-thirds of the maximum daily capacity of 1200 tons. The plant is now turning out pig iron at the rate of 400 tons daily, and E. B. Germany, president, stated it will probably not be able to furnish stocks to Kaiser-Frazer, Henry Ford and others who have sought some of the plant's output until about the first of the year.

It was pointed out that the Lone Star Steel Co.'s accomplishment signified the first time WAA has disposed of a surplus plant to independent operators and the plant has actually gone into production.

Extend Date on OPA Data

Washington

• • • **Time required** for preservation of OPA data by business has been extended for 2 years to Nov. 9, 1949. A new government order requires preservation of all records, documents, reports, books, accounts, invoices, sales lists, sales slips, orders, vouchers, contracts, receipts, bills of lading, correspondence, memoranda and other papers. Previous expiration date of Nov. 9, 1947, "would have prevented the agencies involved from effectively performing their liquidating functions."

Weekly Gallup Polls . . .

Opposition Party Now Leads in Popularity in Britain

Princeton, N. J.

• • • **Although Winston Churchill's** moves to expel the Attlee government of Britain have been unsuccessful in parliament, public support has been dropping away from Attlee's Labor Party.

For the first time since the general election of 1945, the Conservatives are running ahead of the Labor Party in popular voting support. Many voters say the Labor Party has pushed its nationalization program too quickly.

Latest British Institute poll results show that 44 pct of voters expressing an opinion say they would vote Conservative if a general election were held tomorrow, as compared to 40 pct who say they would vote Labor, and 16 pct Liberal and other parties.

The date for the next general election is 1950 and none can be held before then unless the House of Commons votes "no confidence" in the present Attlee government —a step which Mr. Churchill, as leader of the Conservative opposition, has four times tried to accomplish. Each time the parliamentary ranks of the Labor Party have remained solid enough to defeat the motion.

The trend of sentiment among British voters, as distinguished from their representatives in parliament, is shown in the following results of British Institute polls during the past 2 years:

"If there were a general election tomorrow, how would you vote?"

	Pct 1945 Election	May '46 Pct	May '47 Pct	Today Pct
Labor	49	45	44	40
Conservative	39	39	44	44
Liberal	9	13	10	11
Others	3	3	2	5

The British public is closely divided on the question whether the present government is too socialistic. Those who think it is are balanced numerically by those who think it is either not socialistic enough or about right on that score.

But there does seem to be a crystallizing of feeling that the program of nationalization of basic industries has proceeded too rapidly, and perhaps too inefficiently. A substantial number of voters think that the government is, to use the British phrase, "muddling along."

"In its general policy, do you think the Labor government has been too socialistic, not socialistic enough or just about right?"

	Pct	
Too socialistic	42	
About right	30	45
Not socialistic enough	15	
No opinion	13	

"Do you think that the government has pushed along nationalization too quickly, not quickly enough, or at about the right pace?"

	Pct
Too quickly	51
About right	26
Not quickly enough	9
No opinion	14

"Do you feel that the government knows what it is doing, or that it is just muddling along?"

	Pct
Knows	44
Muddling along	49
No opinion	7

However, most Britishers feel that the present economic crisis in their land is not the fault of the government, but that it was bound to come no matter what steps the government took.

"Do you think that our present economic crisis was bound to come, or could the government have avoided it?"

	Pct
Bound to come	60
Could have been avoided	31
No opinion	9

•

• • • **The average American** voter has at least five major grievances to voice against Russia.

Henry A. Wallace recently suggested that Stalin and President Truman meet to discuss Russian-American relations and to present each other with a list of grievances to be aired. The Russian people no doubt have a good many complaints against the United States. So far as the American people are concerned, the five main things wrong with Russia are as follows, judging by an extensive

American Voters Voice Five Of Their Major Grievances Against Russia in Recent National Poll

o o o

public opinion survey by the institute.

(1) That Russia is trying to dominate or rule the world.

(2) That Communists working in the interests of Russia would destroy the Christian religion if they could. The so-called "cold war" between the United States and Russia has some of the aspects of a holy war.

(3) That Russia's refusal to allow travelers and visitors behind the "iron curtain" is an unfriendly act—that the tight veil of secrecy drawn around her activities probably indicates hostile intentions toward us.

(4) That Moscow has seized working control of many satellite states by illegal means.

(5) That Russian failure to cooperate is hurting the United Nations.

Friends of Russia may argue that some or all of those grievances on the part of the American people are unjust or that they show lack of knowledge of the true situation. The purpose of the institute surveys was not to determine what attitude toward the Soviets is right or wrong, but what the majority of Americans are actually thinking.

The instrument of the public opinion survey makes it possible to do this quickly and efficiently. It would be interesting and valuable to know what the Russian people —as distinguished from their leaders—think about the United States. So far as is known, however, no impartial poll-taking machinery exists in Russia.

Opinion throughout the United States was tested on the following questions:

"As you hear and read about Russia

(CONTINUED ON PAGE 162)

Industrial Briefs . . .

• NEW OPENHEARTH—Jones & Laughlin Steel Corp., Pittsburgh, is adding to the capacity of its Otis Works. Included in the program is a new basic openhearth furnace having a rated capacity of 175 net tons, designed to furnish additional capacity for the firm's strip mills.

• CARBOLOY DISTRIBUTOR — Appointment of the G. W. Hubbard Hardware Co., Flint, as an authorized distributor for Carboloy Co., Inc., Detroit, has been announced. Carboloy standard tools, standard blanks, carbide tipped masonry drills and diamond impregnated grinding wheel dressers will be carried in stock.

• FORM SALES SUBSIDIARY — Cincinnati Milling Machine Co., manufacturers of milling, broaching, and cutter sharpening machines, and Cincinnati Grinders Inc., manufacturers of grinding and lapping machines, now serve their customers in Indiana through a sales subsidiary, Cincinnati Milling & Grinding Machines, Inc., with an office in the Chamber of Commerce Bldg., Indianapolis.

• PMI APPOINTMENT—Appointment of Jerry Singleton as assistant to the president has been announced by the Pressed Metal Institute, Cleveland.

• TO HANDLE SALES—Appointment of the Industrial Sales & Engineering Co., Wilkes-Barre, Pa., as field engineers and sales representatives for the Ajax Flexible Coupling Co. Inc., Westfield, N. Y., has been announced. The company is headed by T. A. Evans, O. Price and R. A. Jeffries.

• EXPANDS DRUM SHOP—Completion of an addition to the No. 3 Drum Shop of the Babcock & Wilcox Co., Barberton, Ohio, has been announced. The addition, 275 x 100 ft, will bring the total length of the shop to about 600 ft and will provide a substantially expanded area for the fabrication of drums.

• OPENS RETAIL STORE — Air Reduction Sales Co., Buffalo, has opened a new retail store for the sale of welding products at 806 E. 12th St., in Erie, Pa.

• NEW PEI HEAD—C. D. Clawson, president of Ferro Enamel Corp., was named president of the Porcelain Enamel Institute at the group's sixteenth annual meeting held recently at Cleveland. He replaces Richard H. Turk, vice-president of Pemco Corp.

• PLANT VISITATION—A group of more than 200 executives and engineers were guests of Lukens Steel Co., Coatesville, Pa., in a plant visitation and dinner occasioned by the completion of the company's new sodium hydride descaling and pickling plant.

• MORE ADDING MACHINES—An expansion program to cost $3 million will be undertaken by Burroughs Adding Machine Co., Detroit, according to a recent announcement.

• MODERNIZATION PROGRAM—A $4 million modernization program has been announced by Lunkenheimer Co., Cincinnati, manufacturers of valves and engineering appliances. The program will not involve any new public financing.

• TO SELL SURPLUS — Bendix Aviation Co. has authorized the sale at public auction of surplus equipment with an original cost value of more than $300,000 on Nov. 22, at the company's Teterboro, N. J., plant.

• COOKER FIBM GROWS—National Pressure Cooker Co., Eau Claire, Wis., has completed plans for an expansion program to cost $3 million to enlarge its plants at Wallaceburg, Ont., where the firm makes Martin motors; at Menomonie, Wis., and at Chicago and Los Angeles, as well as a new plant probably to be situated in the town of Hallie, Wis.

Europe's Steel Needs

(CONTINUED FROM PAGE 127)

stockpiling policy should be consulted as to availability of ferromanganese for export."

The European nations' chances of obtaining the 9,405,000 tons of semifinished steel required (the bulk requested by the United Kingdom) for the period 1948-51 are nil if the recommendations of the subcommittee are carried out. The report clearly states that "during the continuance of existing conditions no substantial quantity of semifinished steel can be exported." For comparative purposes, the report points out that the 1948 requirement of 2,244,000 tons is 40 pct of the amount of semifinished steel now being furnished the non integrated producers in the U. S. by the integrated mills.

"An equally or even more serious situation resulting from the exportation of semifinished steel," the subcommittee holds, "is the loss of 'recirculating' scrap." Were it not for the material problem the committee believes that the semifinished steel requirements might be met by bringing now idle bessemer and electric furnaces into operation, although the additional cost factor is recognized as being of importance.

The subcommittee states that if the requirement for 656,000 tons of sheet and strip over the next three years is to be met, it must be met by reducing correspondingly the 818,000 tons now being exported to all nations.

The 500,000 ton requirement for other finished steel mill products, which will only be needed during 1948, does not suffer any serious problems.

The $400 million requirement for steel mill equipment "has not yet been presented in sufficient detail as to justify any opinion as to availability," the subcommittee found. It is assumed that a portion of this equipment amounting to about $60 million is already covered by orders placed in the U. S.

The subcommittee reviews in some detail the current steel situation in the U. S., discussing such factors as capacity to produce, retarding factors, and raw material requirements. On this latter point, it was found that sufficient raw

materials, with the exception of scrap, pig tin and palm oil, are available if supply lines remain open. However, deficiencies in the quality of all major steel-making materials, except tin and palm oil are highlighted by the subcommittee.

In general, the subcommittee findings are reiterated by the full committee in its summary.

Committee findings on other selected commodities are summarized as follows:

Coal: Adequate for meeting aid demands without adversely affecting domestic economy, assuming that there will be no serious work stoppages in the mines.

Mining Machinery and Equipment: The Paris estimate of needs for mining machinery and equipment ($139 million from the U.S.) is accepted as reasonable for increasing European output of coal; the committee, however, disagrees as to the amounts to be shipped during 1948 (a major portion was asked for next year).

Agricultural Machinery and Equipment: The committee holds that the amount requested cannot be used to advantage in the next four years. By slightly increasing present exports to Europe, largely by trimming exports to other areas, the report believes the European farmer could be given a preferred position and European food production stimulated at sufficient pace.

Transportation Equipment: The American ability to supply some materials depends upon transport availability at home and abroad. It is recommended that the freight car-building program be increased from the present 10,000 monthly goal to "a rock-bottom minimum" of 14,000.

The report is cool toward the maritime expansion program, more particularly because the ambitious proposals would require about 5 pct of the requested steel exports.

Petroleum and its Products: It is recommended that aid requirements be scaled down in this category. Foreign needs are predicated to a large extent upon increased use of oil as a substitute for industrial purposes; the committee believes the Paris report overly optimistic for industrial recovery rates.

Minerals: It is recommended that any legislation extending aid should include specific provisions for procuring from the countries assisted quantities of strategic raw materials for this nation's stockpiling program. It is believed that about $250 million worth annually could be obtained in this manner.

Although the Paris requirements are not found to be excessive in terms of basic necessity, the committee finds itself unconvinced that the participating countries were "wholly realistic" in their plans for capital expansion.

Seventy pct of the total U. S. aid will go to Britain, France and Germany, under present plans. The committee observes that France poses "the easiest problem," but sidesteps comment on individual needs.

The new organization to be set up for administration purposes should be represented on all departmental committees, but the departments "should have the final decision," the committee recommends. Any additional allocation or priorities powers which may be granted in connection with the program should be exercised by the departments and not by the new organization, it adds.

"The new organization should not be empowered to decide what the total amount of our exports of any commodity should be," the committee states, "for what share of the total amount of exports should go to the participating countries." It adds, however, that the new organization should be empowered to decide how the amount allocated to the participating countries should be divided among them.

The President's Committee on Foreign Aid, headed by W. Averell Harriman, Secretary of Commerce, is composed of a representative cross section of business people, not Washington officials. For a complete list of committee members and their affiliations see THE IRON AGE of June 26, p. 100.

50 YEARS AGO

THE IRON AGE, *November 4, 1897*

• "The past week has been uneventful, so far as pig iron and steel are concerned. Active furnaces, steel works and rolling mills are crowded for deliveries. It is the fear that activity may decrease as we draw near the close of the year which is causing some uneasiness to those with whom the experience of former winter seasons is still fresh."

• *"Closing prices of leading active stocks:"*

American Sugar Ref.	142⅜
Consolidated Gas Co.	207
General Electric Co.	33½
National Lead	34⅞
New York Central	107⅞
Tennessee Coal & Iron	27⅛
Western Union	88¼

• **"An interesting recent development in the metal trade is the fact that sheet aluminum is now sold at lower prices, relatively, than sheet brass."**

• "Ore rate from the lower lake ports to Pittsburgh has been established at 98¢ per ton. In this charge is included 21½¢ for unloading and dockage, 25¢ for rail transportation and 5½¢ for the haul."

• **"The Damascus Steel Co. at Des Moines, Iowa, has begun suit to force the Des Moines National Bank to deliver a document containing S. R. Dawson's secret process for making steel. Dawson is serving a 10-year sentence in the penitentiary for murdering his son-in-law."**

• "The Oliver Wire Co. of Pittsburgh recently broke the record for wire drawing. In a 24-hr period, 1487 tons reckoned on one-hole drawing were drawn."

Construction Steel . . .

• • • **Fabricated steel awards** this week included the following:

4630 Tons, New York, chronic disease hospital for City of New York to American Bridge Co., Pittsburgh.

1245 Tons, Sacramento County, Calif., superstructure for bridge across Three-mile Slough, near Rio Vista, to Judson Pacific-Murphy Corp., San Francisco.

200 Tons, Wilder, Vt., power plant for Niagara Power Co. of American Bridge Co., Pittsburgh.

170 Tons, Hammond, Ind., lead dross building for American Smelting & Refining Co., to American Bridge Co., Pittsburgh.

150 Tons, Kankakee, Ill., building for Florence Stove Co., to Bethlehem Steel Co., Bethlehem.

150 Tons, Jasper County, Iowa, bridge No. 764-2 through A. Olson Co., to Pittsburgh-Des Moines Steel Co., Pittsburgh.

150 Tons, New Hampshire ,various small state bridges to American Bridge Co., Pittsburgh.

150 Tons, Bedford County, Pa., bridge, Pennsylvania Dept. of Highways, to American Bridge Co., Pittsburgh.

130 Tons, Lycoming County, Pa., bridge, Pennsylvania Dept. of Highways, to American Bridge Co., Pittsburgh.

100 Tons, New Hampshire, various state bridges to Bethlehem Steel Co., Bethlehem.

• • • **Fabricated steel inquiries** this week included the following:

4000 Tons, Milwaukee, plant expansion for Schlitz Brewing Co.

250 Tons, Hunterdon County, N. J., bridge on route 28, New Jersey Dept. of Highways, due Nov. 20.

240 Tons, Lancaster County, Pa., bridge, Pennsylvania Dept. of Highways, due Nov. 21.

200 Tons, Oral, S. D., specidcation 1983 five 50 ft gates, U. S. Bureau of Reclamation, dam project.

200 Tons, Cambridge, Mass., MIT hydrydynamics laboratory. Perry, Shaw & Hepburn, Boston, architects.

100 Tons, Dauphin County, Pa., bridge, Pennsylvania Dept. of Highways, due Nov. 21.

100 Tons, Lawrence County, Pa., bridge, Pennsylvania Dept. of Highways, due Nov. 21.

• • • **Reinforcing bar awards** this week included the following:

3000 Tons, Chicago, Chicago sanitary district contract No. 3, South Side intercepting sewer to S. A. Healy and Peter Kiewit & Sons Co.

2000 Tons, Chicago, Chicago sanitary district contract No. 2, South Side intercepting sewer to S. A. Healy and Peter Kiewit & Sons Co.

1500 Tons, Seattle, second unit, University of Washington Medical-Health Center, through J. C. Boespflug Construction Co. to Northwest Steel Rolling Mills, Seattle.

200 Tons, Lynn, Mass., city hall to Truscon Steel Co., Boston.

185 Tons, Fayetteville, Ark., Arkansas State College dormitory to Laclede Steel Co., St. Louis, through Seth E. Giem & Associates, general contractors, Memphis, Tenn.

160 Tons, Los Angeles, Purchasing Agent,, Dept. of Water & Power, Spec. 6536, to Southwest Steel Rolling Mills.

• • • **Reinforcing bar inquiries** this week included the following:

2000 Tons, Milwaukee, plant expansion for Schlitz Brewing Co.

1500 to 2000 Tons, Shreveport, La., veterans' hospital, bids due Nov. 17.

1000 Tons, Grand Island, Neb., veterans hospital through U. S. Engineers' Omaha office.

900 Tons, South Omaha, Neb., sewer construction previously reported Walsh Construction Co., Davenport, Iowa, low bidder, bid has been rejected.

800 Tons, Massachusetts, state pressure tunnel. B. Pernie & Sons, Framingham, Mass., contractors.

635 Tons, Columbia, Mo., University of Missouri.

500 Tons, Boston, Beth Israel Hospital additions.

200 Tons, Cambridge, Mass., MIT hydrodynamics laboratory.

150 Tons, State of Wisconsin, paving project State Highway Dept., bids close Nov. 18.

145 Tons, Glenn County, Calif., eight bridges across Central Canal and Provident Canal near Willows, California, Div. of Highways, Sacramento, bids to Dec. 3.

115 Tons, Yakima County, Wash., four bridges, SSH 3-A, Parker to Toppenish, Director of Highways, Olympia, bids to Nov. 18.

100 Tons, Riverside County, Calif., road construction between Whitewater Point and Palm Springs, California Div. of Highways, Los Angeles, bids to Dec. 4.

100 Tons, Melrose, Mass., city stadium, Whitman & Howard, Boston, engineers.

• • • **Plate inquiries** this week included the following:

1000 Tons, Cleveland, Nottingham intake water pipeline for City of Cleveland.

400 Tons, Massachusetts, state pressure tunnel. B. Pernie & Sons, Framingham, Mass., contractors.

• • • **Piling awards** this week included the following:

535 Tons, Smith Bluff, Tex., dock at grease and lubricating plant for Pure Oil Co. to Carnegie-Illinois Steel Corp., Pittsburgh.

• • • **Rail awards** this week included the following:

Pennsylvania R. R. has ordered 58,200 tons of standard rails from Carnegie-Illinois Steel Co., Pittsburgh.

• • • **Railroad car awards** this week included the following:

The Santa Fe R. R. has ordered 2050 cars—750 20-ton gondolas from American Car & Foundry Co., St. Louis; 250 70-ton ballast cars from AC&F, Madison; 200 70-ton hoppers from AC&F, Madison, 200 covered hoppers from General American Tank Car Corp., Chicago; 250 tanker cars from General American Tank Car Corp., Sharon; 100 gondolas from Pressed Steel Car Co., McKeesrocks, and 300 50-ton twin hopper cars from the Pullman Standard Car Mfg. Co., Butler. The Lake Superior & Ishpeming R. R. has ordered 400 50-ton ore cars from Bethlehem Steel Co. The Norfolk & Western R. R. will build in their Roanoke shops 10 steam locomotives.

High Bid On German Plant

Washington

• • • **Henry J. Kaiser** was the high bidder, on behalf of the Permanente Metals Corp., for the first German reparations plant offered to American industry. Kaiser bid $203,769 for an aluminum foil plant which, if the bid is accepted, will be brought to the United States. Other bidders were Reynolds Metals Corp., $100,101, and Standard Rolling Mill, $125,000.

Kaiser now has no foil productive capacity. A Kaiser spokesman told THE IRON AGE that present plans call for removal of the six-unit plant from Teningen, Baden, to Spokane, Wash., where it would be near the Kaiser rolling mill.

Bid On WAA Machinery

Chicago

• • • **Continental Foundry** & Machine Co., East Chicago, Ind., submitted a bid of $109,019.95 to WAA for selected items of machinery in the adjacent government surplus steel foundry which the company operated during the war. Ohio Steel Foundry Co. of Lima, Ohio, also submitted a bid of $27,114.34 for some equipment. No offers were received for the real property which also was up for sale or lease. It consists of 8.1 acres of land, a one-story structural steel foundry building with a floor area of 222,000 sq ft, and a two-story brick office building with a floor area of 21,000 sq ft.

Annual Report Optimistic

Milwaukee

• • • **Net sales totaling** $91,703,451, the largest shipments of any peacetime year in its history, are disclosed in the annual report of the A. O. Smith Corp., Milwaukee. The report covers the fiscal year ending July 31.

The company reported net income of $2,502,211 for the year, compared with $1,212,043 before adjustment of reserves in the previous year.

"Our major product divisions have operated at rates limited almost entirely by the supply of materials," the report said, adding that steel supplied by customers had added materially to output.

The report stated that unfilled orders now on hand will require three years to complete, even at the present rate of almost capacity production.

Capital Investment Program of England Cut by $800 Million

London

• • • **A cut of** $800 million in Britain's capital investment program is to be made to support the export drive. How this will affect individual industries and services will be shown in a white paper to be issued shortly.

It will reveal that shipbuilding programs for 1948 will be reduced so as to secure a reduction of 15,000 long tons quarterly in steel requirements. The current allocation is 190,000 long tons a quarter. Shipbuilding in 1949 will be reviewed in April.

The release of new road trucks for the home market will be limited to 50,000 in 1948. Other cuts in the home market will be: new public service passenger vehicles limited to 4,000 in 1948; private cars reduced to 50,000; supplies of light trucks reduced.

The allocation of steel to the gas industry will be reduced by 20,000 to 100,000 long tons a year. Direct building work for the Government will be reduced by stopping work on employment exchanges and by not expanding office accommodation for civil servants as had been planned. Most of the major War Office works and the Air Ministry's new works program will be postponed for at least a year.

The new installation capacity of electric generating stations will rise from 1,150 megawatts in 1948 to 1,600 megawatts in 1949. Thereafter it will be limited to 1,500 megawatts. The North of Scotland hydro-electric projects will go forward, but an attempt will be made to re-arrange the order in which they are to be completed.

New road work will be reduced considerably. Major undertakings, such as the Severn Bridge and Dartford Tunnel, will be postponed. But the London and North Eastern Railway electrification plan, which is three-quarters complete, and the Manchester-Sheffield electrification plan, which will facilitate coal traffic, will go forward. Road maintenance work will be reduced to an extent that will release 20,000 men from the staffs of the highway authorities. The railway building construction program will be reduced. All projects at ports and

(CONTINUED ON PAGE 138)

When you use FASTENERS you have a wide latitude of choice with the

Modern scientific quality-control methods are regular practice in fasteners manufacture.

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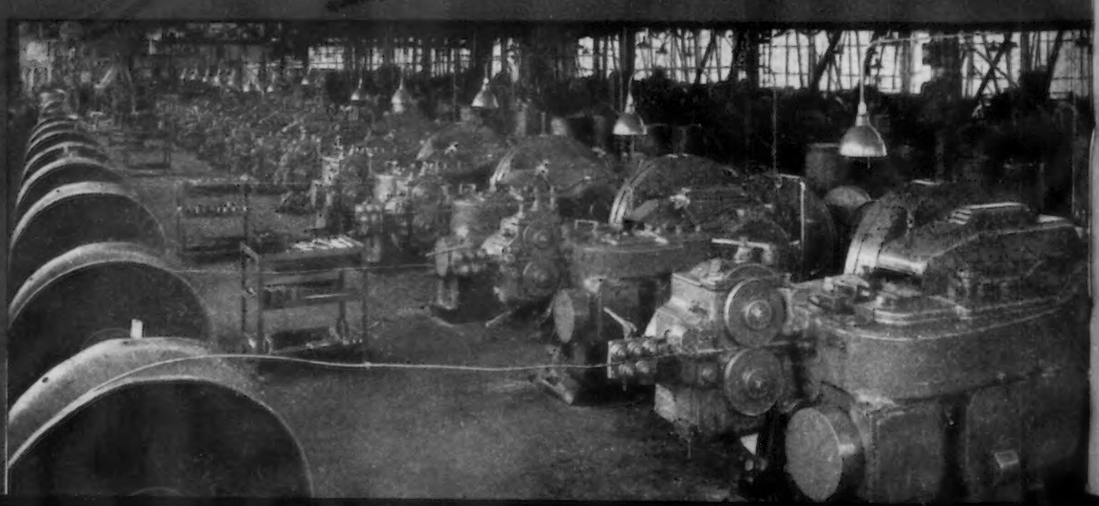
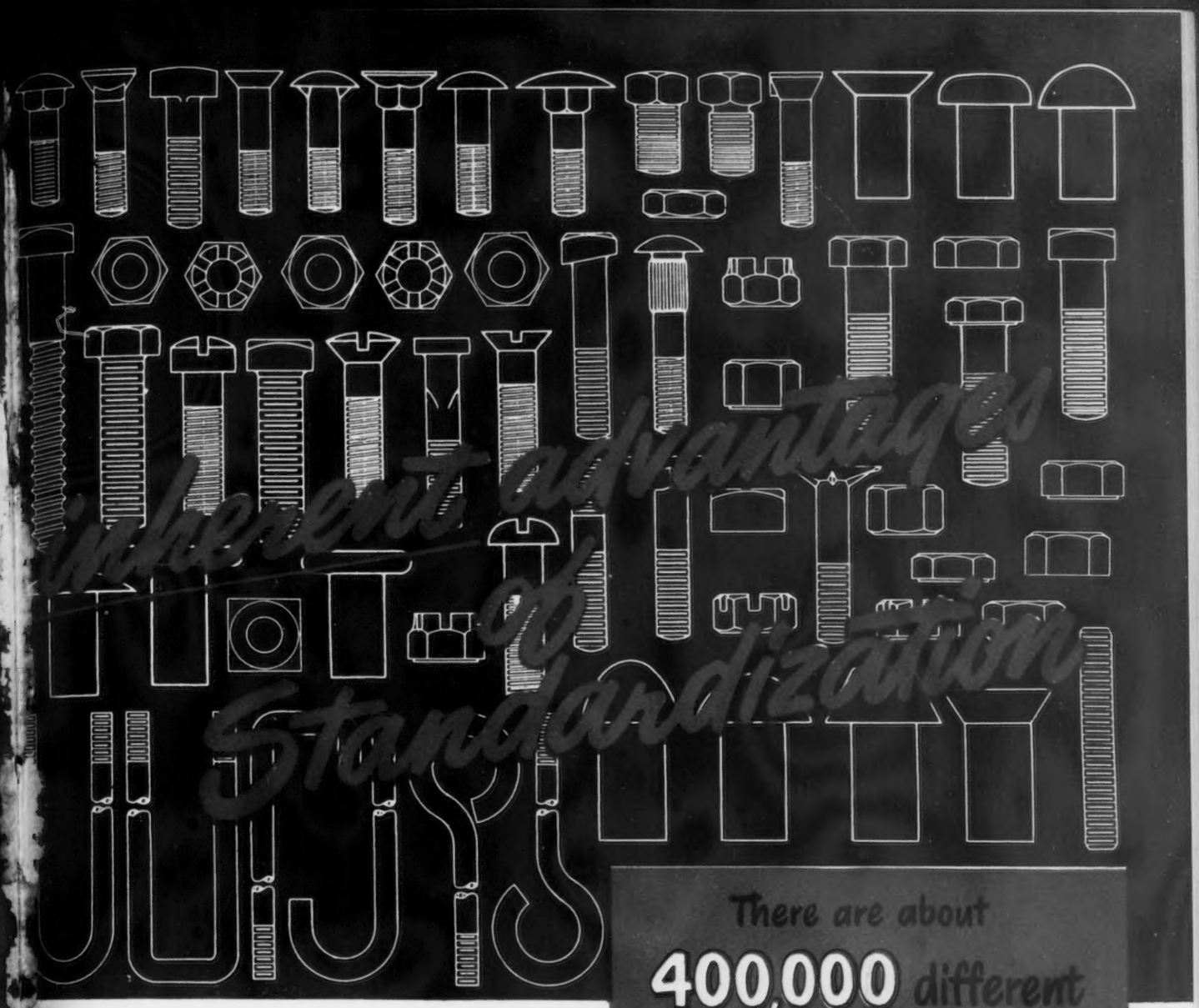
Modern Quality-control methods assure close adherence to Industry standards



The low cost and high quality of modern fasteners is due in large part to the use of modern precision machinery.



There are about 400,000 different styles, sizes and types of STANDARD Fasteners

You are well aware of the many advantages of using *standard* component parts in machines, appliances and structures. When you fasten parts together with Fasteners you can usually find standard items that exactly fit your needs, and that can be obtained interchangeably from any one of a dozen manufacturers, with positive assurance of accurate fit. Sometimes a slight alteration in your design will permit the use of a standard fastener, rather than a minor variation from the standard—and you benefit in many ways by the change.

More and more, engineers, designers and manufacturers realize that the dependable, predictable performance of Fasteners means greatest satisfaction and economy. Being mass-produced, they are low in cost; being accurately made from known materials by familiar manufacturing methods, they are reliable.

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(CONTINUED FROM PAGE 135)

harbors will be postponed unless they can yield an immediate return in the handling of goods or the turn-round of ships.

There will be cuts in capital construction on Civil aviation account. Work on the three runways of London airport will be slowed down. All other work, except maintenance and safety, will cease. In the Home Department, there will be no work on new fire services or approved schools. Existing buildings will be requisitioned, where necessary, for the latter. Air-raid shelter demolition will be accelerated wherever it will yield supplies of steel.

Post Office contracts for new work will be concentrated chiefly on exceptionally old telephone exchange buildings. New telephone installations will be confined to those necessary for urgent purposes. The building program of the B.B.C. will be reviewed on the same basis. Demands for post office plant and equipment will be restricted to $20 million in 1948.

Mexican Government Official Guarantees Foreign Investments

New York

• • • **Mr. Emilio Lanzagorta,** prominent Mexican industrialist, was host at a dinner here recently in honor of General Ignacio M. Beteta, Chief of Military Industry of the Mexican government.

General Beteta stated that the Mexican government stands ready to give every guarantee to American investors who go to Mexico in the interest of promoting industries there within the spirit of the law. He also stated that the vast resources of Mexico are waiting for large capital and technical experts to assist in expanding the economic horizons of the country.

In conclusion, General Beteta emphasized the importance of the meeting of prominent American businessmen with Mexican officials and he expressed the hopes of immediate beneficial results for both countries.

Among the guests present, were prominent executives of large and important American firms such as Bethlehem Steel, American Brass, Johns-Manville, Union Chain & Mfg., Anaconda Wire & Cable, International Nickel, Farrell Birm-

ingham, Gibbs & Hill, Inc., Plastic Wire & Cable, Anaconda Copper, and others, all of whom are interested in the commercial and industrial development of Mexico.

The talks by Mr. Lanzagorta, Mr. Charles Masters of Bethlehem Steel Corp., Mr. W. D. Balmain of Anaconda Wire & Cable Co. and Mr. E. S. Crosby of Johns-Manville were well received. These men offered their cooperation in the industrial development of Mexico.

Shanghai Property Must Now Be Re-registered

Washington

• • • **American nationals,** including corporations and associations, who possess rights or titles to real property in Shanghai, China, which were acquired prior to May 20, 1943, must apply to the authorities of that municipality for re-registration of their property rights and for new deeds of ownership, if they have not already done so.

It is announced by the State Dept. that although the period originally set for reregistration has expired, the Chinese government has agreed to extend the deadline until Apr. 28, 1948.

American holders of real property rights should either apply or have their agents apply to the American Consulate General at Shanghai for certificates regarding those rights, the department said. Chinese authorities require submission of such certificates to protect ownership rights.

Belgian Steel Market To Become Semi-Free Soon

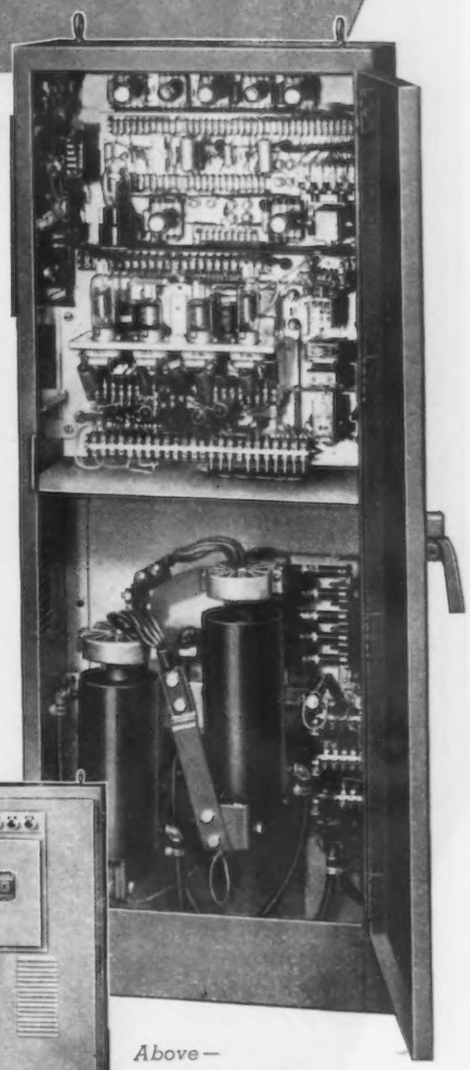
Brussels

• • • **The Belgian Minister** of Economic Affairs has announced that the present system of steel coupons, issued according to allocations and used to get steel, will be suspended during the fourth quarter, and that if results are satisfactory, control over steel sales will be eliminated as of next January.

It is hoped that the government controls can be replaced by voluntary controls within the industry, with priorities remaining in force. Under this plan, the government would continue to survey operations. The quota for the home market will remain at 125,000 tons monthly.

NOW Electronic WELDER CONTROL designed to INDUSTRIAL STANDARDS

***NEW** Square D Class 8993 combination controllers for resistance welders incorporate, in one enclosure, electronic contactor, heat control, synchronous-precision weld timer, and sequence panel. They provide accurate time and current measure recommended for welding non-ferrous metals, stainless steels, small parts and other critical jobs.*



IMPORTANT NEW CONSTRUCTION FEATURES

- All terminal connections and tie points are made accessible by opening main door and swinging out weld time panel.
- Simple tools—screw-driver and pliers—can be used to replace components. Number of soldered connections is minimized.
- Functional sub-panels (contactor, heat control, timing, and sequencing) have separable connectors—may be quickly removed or replaced.
- Designed for mounting on side of machine or for wall mounting.

IMPORTANT NEW CIRCUIT FEATURES

- New separate excitation circuit for ignitrons makes firing independent of voltage or load current. Firing pulses have consistent amplitude and duration for all heat control settings from 20% to 100% current.
- Synchronous-precision weld timing circuit operates on new differential discharge principle. Voltage changes before or during the weld have no effect on timing accuracy.
- All-electronic circuit has no sequencing relays and is of simplified design. For maximum safety, air valve is energized by a magnetic contactor. A no-weld relay disconnects firing tube anodes only in response to no-weld and water-flow switches, and warm-up timer.
- Coupling transformers isolate functional sections of circuit for maximum safety and efficiency. Initiating, no-weld, and pressure switch circuits are 110 volts.

Above—
All circuit terminals and tie points accessible by opening main door and swinging out sequence panel.

Left—
Controller can be arranged either for side of machine mounting or wall mounting.

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Urges Military 'Buying' Of Technical Brains As Well as Beans, Bullets

Pittsburgh

• • • **Charging that** the nation "shows a persistent record of hindsightedness in applying its tremendous civilian research know-how to military matters," Walter Evans, vice-president of the Westinghouse Electric Corp., said before the National Electronics Conference recently, "we must modernize our thinking about military procurement to include scientific brains—along with bullets, and beans, and brawn, and the other measurables," if we are to live in peace in this atomic age.

Mr. Evans urged a "realistic appraisal of the dangers, and common sense planning now," to minimize the possibilities of armed aggression.

He proposed sweeping changes in national preparedness thinking under which science and industry would be admitted to full membership, along with the military, in top-level planning councils; and suggested that American security be entrusted to "a great integrated combat team of four triple-threat departments" including (1) a military high command; (2) a nationwide research organization; (3) an industrial militia for production planning; and (4) armed forces adequate to field test equipment and train personnel.

Driving home the need for such overall planning, Mr. Evans declared: "Even under the growing pressures of World War II, research brains had not qualified as a bona fide item of military procurement—because traditional procurement had centered around those items which could be counted, or weighed, or photographed for the benefit of Congressional committees."

"Funds for the Office of Scientific Research & Development which handled early projects came, not from readily identifiable appropriations, but through the devious device of a special executive appropriation in which the purchase of brain power would not stand out too prominently."

Addressing himself "to the budget-makers in Congress and the American people—not the admirals and generals who must

live within assigned budgets," Mr. Evans pointed out, "Continuing long-term research for preparedness will cost money—a great deal of money. It will require implicit faith in our scientists, and in industry. Every idea explored will not produce a worthwhile development—we must be prepared to gamble to this extent.

"We must end the old order of thinking under which military men felt duty bound to 'have something to show Congress' for every research dollar expended. Some research just doesn't produce immediately showable results. Some projects may be complete duds. We must face this possibility."

More Pittsburgh Firms Pay All of Employees Group Insurance Cost

Pittsburgh

• • • **A trend toward** acceptance of the full costs of employee group insurance by management is seen in reports of medium and small steel fabricating companies in this area. One recent conversion to the company-paid premium plan is Oliver Iron & Steel Corp. here. It has recently completed distribution of descriptive booklets to its employees to explain the combination life, sickness and accident, surgical benefits and hospitalization policy on which the company pays all costs.

A recent report from the Tristate Industrial Assn. whose membership includes some 67 companies having steelworkers' contracts other than basic steel, shows that 13 members report greatly liberalized insurance payments by management as part of the current labor agreement and four companies report full acceptance of insurance costs.

Evidence of a trend toward management assumption of all insurance costs are admittedly still in the minority but the circumstances which have caused firms here to suggest this solution appear to point the way for the future.

It has been a problem for years to obtain the majority of workers required by insurance companies in order to warrant group insurance rates as long as the worker was required to pay from 40 to

60 pct of the premium. Some plants were unable to install insurance plans due to workers' resistance to this extra expense.

Some management, consequently, foresees in full assumption of premium costs the means of giving employees a full measure of protective insurance. In effect, the pay-all insurance agreement represents a real monetary gain for labor and solves a tough management problem in properly protecting employee welfare.

New Forging Plant For Ford to Make 100 Parts

Detroit

• • • **Ford Motor Co.** expects it will be "well into 1948" before its new forging plant at Canton, Ohio gets into production. When capacity operations are reached, Ford expects to turn out a million pounds of forgings daily at Canton for Ford, Mercury and Lincoln cars and the Ford tractor.

The company plans to produce more than 100 major parts in the Canton plant, including gear and axle parts, according to a recent announcement. The plant will be completely equipped with steam hammers, shears, upsetters, forging presses and other types of equipment in addition to shot-blasting machines and heat treating ovens, it is reported. The Canton Div. will also have a tool and die shop.

Approximately 1000 persons will be employed at the former government-owned plant at Canton which was operated during the war by Republic Steel Corp. The plant contains 180,000 sq ft of manufacturing space.

Construction work is expected to start soon on necessary sidings, loading docks and materials handling equipment. At the present time, a large amount of material stored in the plant is being removed, Ford said.

Space made available at Ford's Rouge plant will be used to increase press steel operations and for storage of body parts, it is reported.

Harry G. Howell, former vice-president in charge of production of Tube Turns Div. of Girdler Corp. will direct operations of the new Canton plant. Howell was also associated with Buick and Oldsmobile forging departments.

Nationalization Of Steel Industry In England Is Delayed

London

• • • **Constitutional issues** which had been dormant in England for 36 years are raised by the British government's pending proposal to amend the Parliament Act. Behind the decision is the firm intention of some members of the cabinet to insure nationalization of the iron and steel industry before the present Parliament runs its allotted life.

The Parliament Act of 1911 was passed to restrict the powers of the House of Lords, after they had rejected the Lloyd George budget of 1909, which led to the two general elections of 1910. It was passed by the Lords only after Mr. Asquith had obtained the consent of the King to the creation of sufficent peers to secure its passage if the Lords persisted in amendments which they had made.

At present if a bill is rejected by the House of Lords, the Commons can force it through Parliament by passing it themselves in three successive sessions within two years. On the rejection of such a bill for the third time by the Lords, the bill would be presented to the King and would become an Act without the consent of the peers. It having been felt that in the present economic plight of the country the iron and steel nationalization bill cannot be brought in during the present session of Parliament, the government has decided to attempt a restriction of the powers of the House of Lords by reducing from two years to one year the period during which the Lords may hold up the passage of a bill.

If steel nationalization is introduced next session it could not be enacted in the life of this Parliament under existing procedure if the Lords decided to reject it. It is evident that the administration is determined to insure the passage of the bill and that it evidently fears the Lords' power of veto. Why is not exactly clear. The Prime Minister admitted in his recent speech that leadership of the opposition in the House of Lords so far in this Parliament has been wise and statesmanlike, but evidently on the question of

steel the government is by no means too sure and is determined to take precautionary action.

There was no mention in the King's speech, at the opening of Parliament, of the steel industry. But during the debate in the House of Commons, Mr. Attlee declared, "I believe there is an overwhelming case in the national interest and I would say, in order to avoid any doubt there might be, that it is the intention of the government in the present Parliament to nationalize relevant portions of the iron and steel industry."

There is great criticism here of the government's decision to introduce such a controversial matter as the amendment of the Parliament Act at this time of crisis in the nation's affairs. The decision is believed to be directly due to a conflict of opinion within the cabinet as to the merits and demerits of the nationalization of the steel industry at this stage. While the government as a whole has been committed to nationalization, a number of its members have felt that there were too many things to be done at this moment of crisis to embark on such a project, with all the implications of its effect on industry, and what would inevitably be long periods of debate in the House of Commons, and lengthy committee stages in putting the bill through.

Other members of the cabinet, especially, it is generally believed, Mr. Aneurin Bevan, Minister of Health and left-wing champion in the cabinet, were adamant. A decision to postpone action until later in the life of the present Parliament was ultimately agreed upon.

English Shipbuilding Up

London

• • • **Statistics issued** by Lloyd's Register of Shipping regarding merchant vessels under construction at the end of September show that in Great Britain and Ireland there was an increase of 49,720 tons in the work in hand as compared with the figures for the previous quarter.

The present total of 2,112,669 tons gross is also greater by 237,791 tons than the tonnage which was being built at the end of September, 1946, and has not been exceeded since March, 1922, when the total recorded was 2,235,998 tons.

Export Price Policy Puzzles Belgian And Luxembourg Industry

Brussels

• • • **Discussions have** taken place recently between commercial representatives of the Belgian and Luxembourg steel industries on the subject of price policy for exports.

Two views have been expressed on this subject. The first would maintain prices at their previous level despite the new 3 pct export tax. The other would pass on the tax to buyers on organized markets. No definite decision has been reached. But some producers have decided to embody the 3 pct tax in their f.o.b. quotations, which would mean an advance in prices.

The larger Belgian steel companies emphasize in their reports that foreign buyers show a trend to discuss prices more and more. At the same time, the companies report, costs are increasing more rapidly than the prices which can be obtained on the international market.

The companies stress the fact that recent profits have been coming chiefly from exports, domestic prices having been scarcely high enough to cover costs, even before being decreased to assist government efforts to avoid inflation.

With recent increases of prices in Europe, and prospects of new advances soon, commercial circles reflect the opinion that a new period is beginning for the postwar market.

Reports Higher Earnings

Cleveland

• • • **Cleveland Graphite** Bronze Co. has reported sales of $23,826,259 and net profit of $2,443,309 for 9 months of 1947, equal after preferred dividends to $3.66 a share on the 643,840 common shares.

In the corresponding period of 1946, sales were $19,644,395 with net profit of $1,503,885, equal to $2.19 a share on the present number of common shares.

Third quarter sales were $5,666,768 with profit of $363,193, equal to 51¢ a share, comparing with sales of $7,294,765 and profit of $883,790, or $1.32 a share in the third quarter of 1946.

New Hydraulic Pump Shock Absorber To Give Easier Rides

Pittsburgh

• • • **An "educated shock** absorber" that irons out the bumps in railroad tracks or highway has been developed by Westinghouse research engineers to provide smoother rides for train and bus travelers. The new stabilizer is designed to (1) eliminate more than 60 pct of the bumps and sway caused by irregularities in tracks or roads, (2) enable trains to take curves at more than 25 pct greater speeds, (3) bring about over all improvement in riding ease of trains and busses and (4) permit increased traffic over present rails and highways.

Now being road-tested by one of the nation's leading railroads, the stabilizer is the invention of Dr. Clinton R. Hanna, Stanley J. Mikina and Lawrence B. Lynn of the Westinghouse Research Laboratories. Railroad engineers also made significant contributions to the development. In addition to this application tests are now being planned by a large bus manufacturer.

Floating weights that feel up-and-down and sideway motion, and a pendulum that senses the pull of centrifugal force and gravity, working together or separately detect and respond to bumps or side-sway in just three one-thousandths of a second. They anticipate the movement and correct it before it is felt by the train or bus passengers.

The stabilizer automatically moves the car trucks or bus wheels up and down to compensate for bumps in the road surface. Train wheels are moved from side to side to correct for track weaving. A tilter banks the car or bus body as it rounds a curve. As applied on a railroad car, this is done by six hydraulic cylinders and a pair of motor-driven screw-jacks. Four cylinders take care of vertical bumps and two side-sway.

When the car comes to a bump or dip in the track the floating weight instantly senses the motion of the body as it begins. The movement opens one valve and closes another, causing oil under high pressure to flow into the proper cylinder. The piston in the cylinder moves with just enough

force in the right direction to counteract the bump and hold the car body virtually motionless. The same type of action moves the wheels right or left to correct for sideway and the car body moves forward in a straight line. Flow of oil for the hydraulic system is maintained by motor-driven pumps.

When the train enters a curve, the gyro-controlled pendulum regulates two electrically-driven screw jacks placed at diagonal ends of the car body. If the speed is not quite right for the bank of the track, centrifugal force swings the pendulum. This closes an electrical contact to operate the two jacks which immediately tilt the car body to the correct bank angle.

The tilt mechanism can add up to 6 degrees of additional bank in either direction within 2 sec. So precise is its sense of balance that even when going around a curve at theoretical 40 pct overspeed, the tilter can bank the car to within 1 degree of perfect equilibrium. The permissible speed on curves depends on the design of the locomotive, but even with this limitation the tilter will make possible 25 pct overspeed without passenger discomfort.

Although the best shock absorbers have been able to limit resonance to about 3 in., the new stabilizer cuts it to less than 1 in. —an improvement of some 300 pct. Also, by applying all the hydraulic power of the stabilizer to the wheels and helping them move up and down, the traction power of the car is greatly improved.

ISIS Reelects Officers

Washington

• • • **At its meeting** in Albany the Capitol district chapter of the Institute of Scrap Iron & Steel, Inc., reelected the following officers: President, Louis Sirk, Trojan Scrap Iron Corp., Troy, N. Y.; vice-president, Philip Sher, Hudson Scrap Iron & Metal Co., Albany; secretary, Benjamin Apple, Symansky Bros., Watervliet, N. Y.; treasurer, Charles Buff, Buff & Buff, Schenectady.

Joseph C. Klein, Joseph C. Klein Co., Albany, was elected chairman of the executive committee, the other members chosen being: Alec Henry, Herman Garbowitz, Harris Nathan, Herman L. Symansky, and Israel Raphael.

High Vacuum Symposium Airs Latest Techniques At Cambridge Meeting

Cambridge

• • • **Leading scientists** from the United States and abroad gathered recently in Cambridge to attend the Cambridge High Vacuum Symposium. This meeting, sponsored by National Research Corp. of Cambridge in cooperation with the Division of Industrial & Engineering Chemistry of the American Chemical Society, was devoted to discussions of the latest techniques and developments in the rapidly growing field of high vacuum.

Under the general chairmanship of Richard S. Morse, president, National Research Corp., assisted by Dr. John R. Bowman of the Mellon Institute of Industrial Research, the various sections of the meeting stressed the different aspects of high vacuum.

Dr. Saul Dushman, assistant director, General Electric Research Laboratories, led the group discussing the early history of high vacuum and basic research which led to its present day development.

Dr. Bowman's session covered the field of high vacuum distillation which has led to the production in commercial quantities of vitamins, plasticizers and many other substances which could not be fractionated previous to the development of high vacuum.

Problems in connection with large-scale commercial installation of high vacuum equipment were discussed by outstanding engineers, under the leadership of Dr. John C. Hecker, works manager, Distillation Products, Inc., and formerly production manager of one of the atomic energy production plants at Oak Ridge, Tenn.

The many new developments in the field of high vacuum metallurgy were discussed by scientists led by Dr. John Chipman, head, Metallurgical Dept. Massachusetts Institute of Technology. These discussions covered recent developments in the commercial production of magnesium, gas-free copper and improvements in sintering, as well as vacuum heat treating.

Causes of Diecasting Irregularities

(CONTINUED FROM PAGE 87)

mate contact with the die surface, it loses heat to the die cavity surface and it becomes cooler. As the alloy cools from the liquid to the solid state, it contracts. If no additional molten alloy is forced by the applied pressure into the area of cooling, the cooling alloy may either draw away from the die surface, thereby creating a surface depression on the surface of the diecasting, or it may draw molten alloy from another adjacent portion of the die cavity which still contains molten alloy. When this occurs, a shrinkage cavity is formed in the area from which the molten alloy has been withdrawn.

When the design of the diecasting die is such that in a given location in the die cavity the alloy tends to freeze without the benefit of pressure-feeding, a shrinkage area develops in this location and in so doing it may give rise to a surface irregularity in this area such as a caved-in-spot or a shrinkage crack.

Three principal factors are inter-related when it comes to producing a smooth diecasting surface; pressure temperature, and die design.

If the pressure is inadequate, then the molten alloy is not forced into the die cavity before portions of it solidify. The portions which solidify prematurely block off the transmission of the applied pressure to the portions of yet unsolidified alloy. These latter portions then solidify without the benefit of the applied pressure and are consequently improperly fed.

Even so, if the molten alloy is forced into the die cavity quickly enough, there still may be inadequate applied pressure to press out irregularities such as flow-lines, seam-lines, etc. The employment of adequate applied pressure is vital to the production of a diecasting with a smooth surface and a sound interior.

Applied pressure plays two distinct roles. Firstly, it is one of the main factors governing the velocity of the incoming molten alloy stream, which is extremely important in obtaining smooth surface finish. Secondly, it is the main factor in creating a diecasting with a sound interior.

If the die temperature is too cold, it will have the effect of chilling the molten alloy so quickly that the applied pressure is unable to act to press-out the flow-lines or the seam-lines in time. Water cooling must be done carefully else a portion of the die cavity surface may be rendered too cold and thereby bring about the occurrence of an inferior casting finish.

Overly hot areas on the die cavity surface will cause the molten alloy to remain molten in these areas longer than in other areas, and consequently the alloy adjacent to this localized hot area on the die cavity surface freezes last. It is thus shut off from the advantages of pressure feeding, thereby causing the alloy within the hot area to shrink away from the die cavity surface on cooling. Depressed areas or shrunken cavities on the casting surface are frequently formed in this manner.

Occasionally a gas pocket will be present in the interior of a diecasting at a point underneath a hot spot on the die cavity surface, and when the diecasting is removed from the die cavity, that part of its surface which was just above the gas pocket will be forced upward forming a blister, as illustrated in fig. 7. The occurrence of blisters formed in this manner can be attributed principally to poor gating and venting.

By the proper regulation of pressure and die temperature, and by the employment of correct die design such irregularities as surface blisters, caved-in-spots, flow-lines, deep-seam-lines, and shrinkage cracks can be eliminated.

Frommer[4] was among the first to point out that in the case of aluminum base alloys the employment of a thick gate, a low injection pressure and a high after pressure will generally produce a diecasting with an inferior surface finish as compared with aluminum base alloy diecastings made by the use of thin gates and high injection pressures. In the case of zinc base diecasting alloys, this is not altogether true, as excellent surface finish can be obtained with the use of a heavy gate and pressures that do not exceed 1000 psi. Frommer[5] also clearly demonstrated that good surface finish is not indicative of a sound diecasting.

Occasionally it is not feasible or wise to increase the temperature of the alloy being diecast in order to delay its cooling in an effort to decrease flow and/or deep-seam-lines. As a matter of fact, it is not good practice to maintain the diecasting alloy in the holding pot at a temperature any higher than is absolutely necessary. This is especially true in the case of zinc base alloys, which should rarely be held in the holding pot at 100°F above their melting point. In the case of aluminum base alloys, the temperature to which they can be elevated and maintained prior to diecasting is not quite so critical. However, it is very bad practice to maintain aluminum base alloys at a temperature exceeding 1400°F. But as was said, when it is not feasible to increase the temperature of the diecasting alloy, even by 25 to 50°F, it is necessary to resort to the alteration of either the applied pressure, the die temperature, the die cooling, or to redesign the runner and gating system of the die.

It must be borne in mind that flow-lines do not in themselves decrease mechanical strength, nor do they indicate an unsound interior. A casting surface may have flow-lines, and yet its underlying metal layers may be perfectly sound. The reason for this is to be found in the fact that of the alloy which fills a die cavity, that portion of it which is nearest the die surface is always cooled first.

This article will be concluded in the next issue with a discussion of irregularities affecting dimensional tolerances, mechanical properties, and machinability.—Ed.

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Manufacturers' Poll Finds Foreign Orders On Downward Trend

New York

• • • **Since mid-1947,** foreign orders for manufactured products have been declining for a majority of the producers cooperating in a survey on exporting which has just been completed by the National Industrial Conference Board. They expect the trend "to continue downward, barring additional government lending."

Three out of four exporters report sales for the first six months of this year in excess of the comparable period of 1946. These gains are "not expected to be fully maintained" throughout the remainder of the year.

About half the exporters fail to express concern over the anticipated drop in foreign sales, inasmuch as they expect the domestic market to offset any losses. For the others, either foreign sales bulk too large in total shipments or domestic demand has already fallen off. Some state that a switch to the domestic market could cost them their overseas organization which has taken time and money to establish.

Most exporters agree that government loans and aid to foreign countries would help to cushion the decline, although they are not agreed as to "the advisability of additional credits because of their inflationary effects" upon our economy. Many would prefer to see foreign dollar credits built up through imports to this country. These executives, however, seem to recognize the problems inherent in locating at this time sufficient foreign products to close the $6 billion gap between exports and imports reported thus far this year.

Manufacturers of machine tools are the most pessimistic over the trend in foreign sales. With but one exception, executives reporting for this industry tell of reduced business abroad. In no industry group is there a majority opinion looking to a continuation of export shipments at the high level which industry has been enjoying since the war. Frequently, forecasts of sustained demand are predicated upon the belief that foreign governments will continue

to classify certain products as essential.

Although not yet a formidable factor, competition from foreign producers who are getting back on their feet is responsible for some of the losses sustained by a few exporters.

There is a diversity of opinion regarding the methods which should be used to step up our foreign purchases. Some suggestions concern a change in our tariff policy. It is recognized that reduced tariffs will work a hardship on some producers. The success of this approach is questioned by one manufacturer who feels that tariff cuts as deep as appear to be necessitated by our huge export surplus "could wreck our industry." Because of the size of this surplus and adverse conditions prevailing in many European countries, many exporters favor some type of foreign credits. These exporters are careful to emphasize the need to "follow through" on all loans so that they will be directed toward increasing the borrowers' productive capacity. Meanwhile, one manufacturer suggests that we expand our purchases of strategic raw materials.

Kingdom of Norway To Receive Credit For U. S. Purchases

Washington

• • • **An agreement has been** completed with the Kingdom of Norway by which that country will receive a credit of $12 million toward the purchase of domestic surplus property.

This raises to $57 million the amount of credit extended to foreign powers for this purpose. Credit arrangements have previously been extended to The Netherlands in the amount of $10 million each.

Sales of domestic surpluses under the credit program must be limited to those types of goods which are in long supply and which have previously been offered to priority claimants. Purchases also must be confined to goods not readily obtainable from overseas surplus under the Foreign Liquidation Commission.

Still another restriction provides that property purchased in this country must be used in the

territory of the purchaser; in effect, this rules out re-exportation by the purchaser. However, this does not prohibit exportation of finished products which may have been processed from surplus purchases.

While the arrangements with individual nations may vary slightly in detail, generally, terms of credit (except as limited by the Surplus Property Act) are generally along the lines of those extended by the Export-Import Bank for development and reconstruction loans.

Big Electric Current Can Be Produced With Simplified Equipment

Chicago

• • • **A revolutionary new** method of creating tremendous electrical currents with relatively simple equipment was shown to industry for the first time at the National Metals Exposition in Chicago, October 18th to 25th. Under development by Progressive Welder Co., Detroit, the device, according to John D. Gordon, general manager of the company, is designed to facilitate the decentralization of industry and establishment of manufacturing plants in localities away from electrical power supply centers.

To deliver as much as 50,000 amperes of direct current, the new unit requires only an ordinary 15 or 25 hp motor to operate it (about the size used on an average lathe, today). This motor drives a low-voltage generator to which is attached an extremely heavy flywheel.

What the device does is to take a small amount of power from an ordinary electric supply line to run the three-phase 15 hp motor and store this energy up in the rapidly spinning flywheel. Now, when the heavy load is applied, the generator—instead of stalling its drive motor under the overload—is kept turning by the energy of the flywheel, re-converting the mechanical energy in the flywheel back into electrical current of the high intensity required. While this occurs the flywheel slows down slightly. As soon as the load is cut off again, the motor speeds up the flywheel, restoring the energy consumed.

Simplified Practice Recommendation For Welded Wire Fabric

Washington

• • • **A proposed simplified** practice recommendation for welded wire fabric reinforcement for concrete pipe has been submitted to producers, distributors and users of this material for approval, or comment, or both, according to an announcement of the Commodity Standards Div. of the National Bureau of Standards.

This fabric is used to reinforce concrete sewer and culvert pipe, and is made by spacing longitudinal and transverse wires at regular intervals and welding them together where they cross to form rectangular openings. It is supplied to concrete pipe manufacturers in rolls of 150 to 300 ft.

The proposed recommendation gives the area of longitudinal wires per linear ft of fabric, and the spacing and gage of longitudinal and transverse wires. Sketches are included to show how the area of circumferential reinforcement is determined and the location of the longitudinal and transverse wires in place in a pipe.

The proposal lists 45 styles of fabric, in place of the 311 styles which an industry survey disclosed were used. If generally accepted, the simplified list will represent a reduction of 266 styles, or approximately 86 pct. It is estimated that the 45 styles recommended will satisfy 90 pct of the demand for welded wire fabric reinforcement.

If generally approved as submitted, or as adjusted in accordance with suggestions which may be received, it will be promulgated and issued in printed form.

Mimeographed copies of the proposed recommendation may be obtained from the Commodity Standards Div., National Bureau of Standards, Washington 25.

Blaw-Knox Earnings Up

Pittsburgh

• • • **Total sales and billings** for Blaw-Knox Co. and subsidiaries for the first 9 months of 1947 were $39,303,760, compared with $35,997,797 for the corresponding period of 1946. Net profit after taxes for the nine months period

was $2,224,521 or $1.65 per share. This 1947 profit compares with $1,742,805 or $1.30 a share in the corresponding 1946 period.

Net profit for the third quarter of 1947 after taxes was $842,238 or 62 cents a share, and compares with $688,741 or 51 cents per share in the third quarter of 1946.

William P. Witherow, president, stated that operations thus far in 1947 have been impeded to some extent by material shortages. He reported that incoming orders in the September quarter were above the year's average and that the backlog on September 30 was $27.8 million.

Officers Elected At Metal Powder Assn.

New York

• • • **A luncheon and** the annual business meeting of the Metal Powder Assn. was held recently in Chicago. The following officers were reelected: H. E. Hall, president (president, Metals Disintegrating Co.); S. K. Wellman, vice-president (president, S. K. Wellman Co.); and Robert L. Ziegfeld, acting secretary-treasurer.

Two new members elected to the board of directors to replace retiring board members are George H. Tulley, manager, Metal Powder Sales, Metals Refining Co., and T. R. Moore, assistant sales manager, General Aniline & Film Corp. T. L. Robinson was elected chairman of the board.

German Factories to Be Shipped as Reparations

London

• • • **The British Control** Commission and the U. S. military government have announced as final figures that altogether 682 German factories, 380 of which are industrial establishments and the rest strictly war plants, are to be dismantled as reparations under the new level of industry plan for the bizonal area. This is less than half the number of plants which were to be broken up under the old agreement fixed in the spring of 1946, but has nevertheless caused dismay among the German public.

It is emphasized, however, that German industry retains enough capacity to sustain normal activities.

National Malleable Reports Profits Are Down from Last Year

Cleveland

• • • **National Malleable & Steel** Castings Co. reported profit of $514,521 for the first nine months of 1947 after provision of $524,500 for Federal income taxes, but before a special charge of $283,639 against possible raw material inventory losses. The profit compares with $545,270 in the corresponding period of 1946 after tax provision of $646,400.

Cleve H. Pomeroy, president of National Malleable, said results in the third quarter were adversely affected by the long stretch of excessively hot weather which impaired efficiency in the company's five foundries and also brought postponements of delivery schedules from customers similarly affected.

Net profit for the third quarter was $154,668 after tax provision of $143,200, but before applying $108,683 to the special charge for possible raw material inventory losses.

Electroplaters to Have 3-Year Training Program

New York

• • • **Organized to produce** fully trained job electroplaters and polishers, a training and lecture schedule launched by the Masters' Electro-Plating Assn. and operating under the New York State Apprenticeship Council, is based on the actual operations and flow of work in representative job plating shops in the New York area. The program is designed to cover all of the basic operations in a job plating shop engaged in miscellaneous and representative finishing of metalwork, progressing from simple skills to work requiring a high degree of proficiency.

The program includes 3 years of training comprising 6000 hr of working time and 432 hr of instruction in lecture form. Rate of pay for polishers as well as platers during training periods ranges from 60 pct of the journeyman's minimum rate in the first 6 months to 95 pct of this rate in the final period.

Adolph Bregman, consulting en-

gineer, New York City, describing the program in the *Monthly Review*, states that, as one shop rarely provides experience in every phase of electroplating and polishing, limitations which may result in training should be compensated for by lectures and laboratory work during the last year of apprenticeship, at which time he suggests that all phases of metal finishing be surveyed.

The training program for polishers is divided into six 6-month sessions, each of which includes a shop training period of 1000 hr and, with the exception of the fourth and fifth of the series, a 72-hr lecture program.

Names ISIS Officers

Washington

• • • **At its meeting** recently the St. Louis chapter of the Institute of Scrap Iron & Steel, Inc., elected the following offices: President, Samuel I. Lefton, Lefton Industrial Corp., St. Louis; first vice-president, Charles Forcheimer, Jack R. Forcheimer & Son, St. Louis; second vice-president, Sidney Grossman, Grossman Iron & Metal Co., Inc., St. Louis; third vice-president, Stanley Claster, Luria Bros. & Co., Inc., St. Louis; secretary-treasurer, George Gillerman, Gus Gillerman Iron & Metal Co., St. Louis.

Frank G. Tuschman, Steel Baling Co., East St. Louis, Ill., was elected chairman of the executive committee, the other members chosen being: Abe P. Ashner, Hyman Becker, Isaac Bierman, D. Lee, Charles Harding, Nathan G. Rochman, Richard Rosenthal, Samuel Wool, Sol Mack, and B. Rossen.

Bendix Aviation Co. To Sell Surplus Equipment

Teterboro, N. J.

• • • **Paul Kifner,** vice president of the Asset Realization Company, announced today that Bendix Aviation Company has authorized the sale at public auction of surplus equipment with an original cost value of more than $300,000 on Saturday, November 22, at the company's Teterboro, New Jersey, plant.

Articles to be sold include a wide variety of surplus machinery, tools, precision instruments, photographic equipment, heat-treating equipment and parts.

Swedeland Iron May Ease Foundry Crisis Of Pig Iron Supply

Philadelphia

• • • **Some foundries** in eastern Pennsylvania have already been forced to close down due to the acute pig iron shortage and others are expecting to close soon. The supply position has been made particularly acute by the closing down of Alan Wood's large furnace, expected to be blown in about mid-December, and the scheduled closing of a Bethlehem furnace on Nov. 17.

Three principal pig iron consumers have assured their requirements for the next 5 years by buying out a sufficient interest in the E. & G. Brooke Iron Co. at Birdsboro, Pa., to obtain almost their entire production. The consumers involved are Lukens Steel Co., Worth Steel Co. and Warren Foundry & Pipe Co. This development leaves other pipe foundries, and some mills in this area out in the cold for part of their winter's supply of pig iron.

With this agreement, however, some Swedeland iron will become available for sale to other consumers, as they were suppliers of basic iron to both mills. This depends largely on the price activity in the local scrap market. If prices continue to rise, there is little doubt that Alan Wood will use a larger share of its iron for steel production.

Brooke's iron production of about 350 tons per day will not be sufficient to provide the major portion of the requirements of any of the three consumers involved in the deal. These consumers will continue to look to Swedeland production for the major portion of their requirements. It is understood, however, that there is to be some cut-backs in Alan Wood's basic production and, if scrap prices permit, some increase in foundry iron production. The Brooke transaction is understood to have been prompted by an offer by the Phoenix-Apollo group to purchase Brooke stock at $13 per share in order to assure its pig iron supply.

An ironic byproduct of the furnace shutdown in the area is that coke, formerly in critically short supply, is now available in ton-

nages sufficient to meet the needs of established consumers.

Even before the shutting down of the furnaces mentioned, pig iron consumers in this area were in desperate straits for lack of iron. There is very little iron coming in from Birmingham because industry growth in the South during the war has made it desirable for producers to ship most of their production locally.

Two Birmingham producers ship no pig iron to this area. Very little Buffalo iron is coming into this area. Tonawanda Iron Corp., at North Tonawanda, N. Y., has shipped no pig iron into this area for some time. Now it is reported that its entire pig iron production will go to its parent company, American Radiator and Standard Sanitary Corp.

One mill in this area recently obtained 2000 tons of pig iron from Pueblo, Colo., paying an f.o.b. furnace price well above the local market, plus some $20 per ton freight costs. It is understood that the producer, Colorado Fuel & Iron Co., is sold out for the balance of the year.

Consumers no longer ask how much pig iron costs, but only whether they can obtain some iron. Now that the Daingerfield furnace operated by Lone Star Steel Co. is again in blast, consumers will, without doubt, seek more western iron despite its high delivered price. The major Daingerfield tonnage is earmarked for some time for housing requirements only.

Consumers are willing to take all the silvery iron they can get, even at today's high prices, contrary to wartime and prewar practice. With silvery iron, foundries can use more scrap in the charge, which serves to bring down the silicon content to desired levels.

Bethlehem Steel Co.'s new furnace at Sparrows Point is expected to be blown in in the first quarter of 1948. At present there is a strike of bricklayers that is holding up construction. There is little probability that any of this prospective iron may be made available for consumers here as it is expected that all of it will be required for Bethlehem's own steel production. Consumers report that very little Bethlehem iron has been going into the market.

Washington

(CONTINUED FROM PAGE 110)

spects because it aroused the animosity of the industry without improving observance of the regulations."

WHILE OPA found some of the violations to be deliberate, it was also realized that in the beginning "most were the result of unfamiliarity with the provisions of the regulations or inability to grasp the idea that some of the pricing practices developed in a free market might be prohibited under wartime conditions."

Perhaps the most useful technique developed in handling scrap price violations was publicity, according to OPA. "When a violation was discovered, the offender was urged to meet with stabilization officials and urged to make restitution of his overcharges." If he did so, a generalized press release was usually issued stating the facts and describing the nature of the case. If he did not comply, a release naming names was issued. This technique had some effect and on a number of occasions recalcitrants repented after being given the full treatment.

"It was not until after the passage of the Emergency Price Control Act in January 1942, however, that adequate enforcement of the iron and steel scrap regulations became possible. The provisions for treble damage suits, injunctions, and criminal actions embodied therein operated as a strong deterrent to would-be violators. Furthermore, the act permitted injunctive action against consumers. Compelling them to stiffen their policies on rejection added an important control on evasion."

The enforcement program relying on routine field inspections by qualified graders put into operation after the passage of the 1942 act succeeded in bringing about substantial compliance in the scrap industry, states OPA. "Although an exact count is not available, it is known that hundreds of violations brought to light were processed to successful conclusion. It has been estimated that the procedure reduced violations to 10 pct or less."

In conclusion, OPA's attitude on the ending of price control on the above named commodities is characterized best by the expression, "I told you so."

Weekly Gallup Polls

(CONTINUED FROM PAGE 131)

these days, do you believe Russia is trying to build herself up as the ruling power of the world, or is Russia just building up protection against being attacked in another war?"

	Pct
Ruling power	76
Protection	18
No opinion	6

"Do you think Communists would destroy the Christian religion if they could?"

	Pct
Yes	72
No	15
No opinion	13

"As you know, very few people are allowed to enter or visit Russia. Why do you think Russia is so secretive?"

Principal answers: (1) She is hiding something, preparing for war, keeping secrets for military and security reasons; (2) she doesn't want the world to know anything about what she's doing; Russians are secretive by nature and always will be; (3) she's afraid to show her poverty and weakness; (4) she doesn't want her people to know about the outside world because they might become discontent.

"Which of the following nations, if any, does Russia control today—that is, which of these countries are satellites of Russia?"

	Yes Pct	No Pct	No opin. Pct
Poland?	78	5	15
Yugoslavia?	74	5	19
Czechoslovakia?	69	8	21
Hungary?	67	9	22
Albania?	55	12	31
Finland?	51	27	20
Norway?	14	53	31
Sweden?	8	64	26

The figures total 98 pct in each instance because 2 pct said no country is a Russian satellite.

"How would you say Russia has gained control of these countries?"

Principal answers: (1) By force, power, conquest or intimidation; (2) by infiltration; (3) by setting up puppet governments.

"Do you think the split between Russia and the United States will affect the United Nations—that is, will it help it, hurt it, or will it make no difference?"

	Pct
Help	6
Hurt	72
No difference	16
No opinion	6

"Do you think that Russia will leave the United Nations?"

	Pct
Yes	42
No	34
Qualified	5
No opinion	19

MACHINE TOOLS

. . . News and Market Activities

Some in Machine Tool Industry Appear in State of Hesitation

Estimates Business May Reach A Total of $350 Million By End of This Year

o o o

• • • **Despite the fact** that many machine tool users are in a highly receptive state of mind on new equipment, some segments of the industry are finding that the dew is definitely off the daisy where machine tool show inquiries are concerned.

Gist of the situation seems to be that the shop men are sold but the higher-ups are on the fence in the "wait-and-see" state of hesitation.

While presidential election years are generally considered lean for the machine tool industry, this is not necessarily so, and some observers believe the "wait-and-see" policy should pretty well spend itself by the end of the first quarter of 1948, primarily because of the shortages. It may also be that some people are whistling in the dark.

According to a recent estimate by one of the industry's better observers, the machine tool business this year may total $350 million, which dollarwise looks like quite an operation for a peacetime year. To reach $400 million in 1948, as some sources have suggested, would require an industrial boom beyond the wildest dreams of the battiest bureaucrats.

On the other hand, the country's shops are probably about as well tooled up at the present time as they have ever been, if not better, and the machine tool builder has been hesitant in the past to raise prices in the face of a dull market.

Many builders and dealers are far from satisfied with the tangible results of the machine tool show. Deliveries on most lines of equipment are very good. Most dealers are going along all right and certainly no complaint will be heard from this source if November is as good a month as October. But some segments of the industry are going to have difficulty getting the seed back from the show, according to reports.

Many dealers are watching the status of the Marshall Plan with considerable interest, since if it goes through, it may mean that some foreign countries can buy a little capital goods in this country. In the meantime, some of the Swiss equipment which is imported here is moving as well as or better than some domestic lines, and where it is noncompetitive, it is moving very well.

Trade sources believe that machine tool dealers will be lucky to do as well in 1948 as they have in 1947 (as will the builders) primarily because industry seems to be pretty well caught up in equipment requirements, and freezing machine tool inventories for the JANMAT program has cut some dealers out of a piece of business they didn't want to lose. But it lessened machine tool builders' surplus problem.

At a War Assets Administration warehouse in the last week, 150 machines (unwanted by JANMAT) were put on sale and 52 holders of veterans' priorities turned up for the sale. Without a veterans' priority in such a case, the average machine tool dealer is out in the rain.

In Detroit, a survey of machine tool distributors and producers indicates that the bloom may be fading from the initial interest in machine tools that was generated by the Machine Tool Show in Chicago. Machine tool sources continue to report "lots of inquiries" and the interest, if anything, in transfer type equipment is snowballing. However, the number of orders for nontransfer machines actually being placed is reported to be falling off. The interest of small shops in new machines has come as a pleasant surprise to many Detroit suppliers, it is reported.

An unexpected windfall for the industry this week, it is said, is the reported reinstatement of part of an extensive machine tool program for Detroit Transmission Div., General Motors. Several months ago it was officially reported that the program was to be held up indefinitely. Some sources interpreted this to mean cancellation of the entire program. Contracts for special machines have been reinstated, it is disclosed, although orders for standard machines are still being held on the inactive list.

There are also unconfirmed reports that Ford's interest in the automatic transmission produced by the Detroit Transmission Div. of Borg Warner has quickened, but the latest official statement from Ford on the subject is that final engineering decision on its automatic transmission has not yet been made.

Tool and die work in the Detroit area is reported to be spotty and there are no indications at the moment that any of the major tooling programs are now in process. With most Ford tooling orders concentrated in a few shops and a substantial amount of tooling being carried on in captive shops, some Detroit tool shops, it is reported, are operating with drastically reduced personnel. Meanwhile, claims of a critical shortage of experienced tool and die workers in the Detroit area continue to be heard.

In the East sales in some lines in October were less than in September and September was a disappointing month to most of the trade. Bench tool makers did relatively better in October than heavier equipment. With the latter, 1947 apparently has been an up and down year. They either have had almost too much business or relatively none.

NONFERROUS METALS

. . . News and Market Activities

Lead

• • • **The lead market** is very firm and producers are able to take only the normal requirements of their customers. There are indications that most consumers are ordering to build inventory. A study of industry figures indicates that in the two month period between Sept. 1 and Nov. 1, manufacturers inventories have gone down about 17,000 tons. Records of recent years have shown Sept. 1 to be the inventory high point of the year, but it is expected that this will not be true during 1947. There is no indication of any immediate change in the price of lead.

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Copper

• • • **During the week** the strike of railroad workers at the Utah Mine of Kennecott was settled and strikers went back to work on Friday. Since the power did not go on until Monday, it was a 3-week loss of production estimated at 15,000 tons. Some market observers believe that the copper market would have tightened up severely even without the Kennecott strike, however. All producers have opened their books for December business.

Wire mill orders continue to be placed in heavy tonnage. Some 4 to 5 weeks ago the wire mills came to realize that they were cutting into their backlogs to the point that they expected to be pretty well caught up by December. New orders in heavier volume have been reaching them recently and apparently they have been reassured. Sales to brass mills are reported to have improved over a month ago.

Export copper has become somewhat more active and producers report greater inquiry for new tonnage. When present contracts run out at the end of the year, it is expected that there may be difficulty in obtaining additional U. S. credits or currency by that time. F.a.s. New York prices quoted higher than 21.50¢ per lb represent sales on the West Coast at well below that figure, with addition of a fraction of a cent freight cost. The Tacoma refinery of American Smelting & Refining Co., originally planned to gain the freight advantage in sales to the Far East, must now sell on a penalty basis.

The domestic price remains firm at 21.50¢ but there is no immediate prospect of a price rise as major producers would be unwilling to see an advance for competitive reasons.

•

Zinc

• • • **Producers report** that the market is firm now and has been since the pick-up in the foreign market on Sept. 15. Prime Western and Special High Grade are not easy for consumers to find, but High Grade is more readily obtainable. Producers are selling for December, and some are selling into next year on an average price basis. There have been no further requests for sale of zinc into the permanent stockpile and it is doubted by the trade that any producer would be in a position to make an offer of the metal to three consumers without obtaining acceptance. The export price of Prime Western is reported at 10⅛¢ f.a.s. Gulf Ports. This is higher than the domestic price less the duty. But only producers with drawback credits would be willing to export in this market. There is no indication of any price movement imminent.

Nonferrous Metals Prices

Cents per pound

	Nov. 5	Nov. 6	Nov. 7	Nov. 8	Nov. 10	Nov. 11
Copper, electro, Conn.	21.50	21.50	21.50	21.50	21.50	21.50
Copper, Lake, Conn.	21.625	21.625	21.625	21.625	21.625	21.625
Tin, Straits, New York	80.00	80.00	80.00	80.00	80.00	80.00
Zinc, East St. Louis	10.50	10.50	10.50	10.50	10.50	10.50
Lead, St. Louis	14.80	14.80	14.80	14.80	14.80	14.80

August Metals Output Declines in Canada

Ottawa

• • • **Canadian production** of copper in August amounted to 18,035 tons, compared with 19,396 tons in July and 14,678 tons in August 1946. For the first eight months of this year, production totaled 148,845 tons compared with 121,304 tons in the corresponding period last year.

Production of nickel in August amounted to 9981 tons compared with 9789 tons in July and 7819 tons in August 1946. Production for the first eight months this year totaled 77,758 tons compared with 61,801 tons in the like period last year.

August output of lead in all forms amounted to 13,612 tons compared with 14,052 tons in July and 14,901 tons in August 1946. For the eight months ending with August, lead output totaled 107,410 tons compared with 123,501 tons in the corresponding period last year.

Primary zinc produced in August amounted to 16,709 tons, as against 18,028 tons in July and 19,429 tons in August 1946. In the first eight months this year, zinc output totaled 139,294 tons as compared with 161,171 tons in the same period of 1946.

Exports of lead in pigs during August amounted to 7487 tons, making the total for the year to the end of August, 81,824 tons.

Beryllium Metals Advance

New York

• • • **Beryllium producers** have advanced the price of the master alloy for beryllium copper by $3.50, bringing its price to $20.50 per lb of contained beryllium for the 3.75 to 4.25 pct Be content alloy.

One producer has advanced the price of the beryllium aluminum master alloy by $4.50 to a price of $40.00 per lb of contained beryllium for the 5 pct Be content alloy. Another producer is now studying its costs to determine whether its price should also be increased.

Primary Metals

(Cents per lb, unless otherwise noted)

Aluminum, 99+%, f.o.b. shipping point, freight allowed 15.00
Aluminum pig, f.o.b. shipping point 14.00
Antimony, American Laredo Tex... 33.00
Beryllium copper, 3.75-4.25% Be; dollars per lb contained Be....$20.50
Beryllium aluminum 5% Be, dollars per lb contained Be.....$35.50
Cadmium, del'd $1.75
Cobalt, 97-99% (per lb)...$1.65 to $1.72
Copper electro, Conn. Valley..... 21.50
Copper, lake, Conn. Valley 21.625
Gold, U. S. Treas., dollars per oz..$35.00
Indium, 99.8%, dollars per troy oz. $2.25
Iridium, dollars per troy oz...$80 to $90
Lead, St. Louis 14.80
Lead, New York 15.00
Magnesium, 99.8+% 20.50
Magnesium, sticks, carlots 36.00
Mercury, dollars per 76-lb flask, f.o.b. New York .....$81 to $83
Nickel, electro, f.o.b. New York... 37.67
Palladium, dollars per troy oz. ..$24.00
Platinum, dollars per troy oz...$62 to $65
Silver, New York, cents per oz....74.625
Tin, Straits, New York 80.00
Zinc, East St. Louis 10.50
Zinc, New York 11.06
Zirconium copper, 6 pct Zr. per lb contained Zr. $8.75

Remelted Metals

Brass Ingot

(Cents per lb, in carloads)

85-5-5-5 ingot
No 115 ..... 17.50-18.00
No. 120 ..... 17.00-17.50
No. 123 ..... 16.50-17.00
80-10-10 ingot
No. 305 ..... 21.50-22.00
No. 215 ..... 19.50-20.00
88-10-2 ingot
No. 210 ..... 27.25-27.75
No. 215 ..... 25.75-26.25
No. 245 ..... 19.75-20.25
Yellow ingot
No. 405 ..... 13.75-14.50
Manganese Bronze
No. 421 ..... 15.75-16.50

Aluminum Ingot

(Cents per lb, lots of 30,000 lb)

95-5 aluminum-silicon alloys:
0.30 copper, max. 15.75
0.60 copper, max. 15.50
Piston alloys (No. 122 type)..... 14.50
No. 12 alum. (No. 2 grade)..... 14.00
108 alloy 14.25
195 alloy 15.00
AXS-679 ..... 14.50
Steel deoxidizing aluminum, notch-bar, granulated or shot
Grade 1—95 pct-95½ pct 14.75
Grade 2—92 pct-95 pct 13.75
Grade 3—90 pct-92 pct..... 12.50
Grade 4—85 pct-90 pct 12.00

Electroplating Supplies

Anodes

(Cents per lb, f.o.b. shipping point in 500 lb lots)

Copper, frt. allowed
Cast, oval, 15 in. or longer..... 37⅝
Electrodeposited 32.34
Rolled, oval, straight, delivered.. 32.59
Brass, 80-20, frt allowed
Cast, oval, 15 in. or longer 33¾
Zinc, Cast, 99.99 ..... 18¾
Nickel, 99 pct plus, frt allowed
cast 51
Rolled, depolarized 52
Silver 999 fine
Rolled, 1000 oz. lots, per troy oz. 67¼

Chemicals

(Cents per lb, f.o.b. shipping point)

Copper cyanide, 100 lb drum..... 43.00
Copper sulphate, 99.5, crystals, bbls 11.50
Nickel salts, single, 425 lb bbls, frt allowed 14.50
Silver cyanide, 100 oz. lots, per oz. 54.00
Sodium cyanide, 96 pct, domestic, 200 lb drums 15.00
Zinc cyanide, 100 lb drums 34.00
Zinc, sulphate, 89 pct, crystals, bbls, frt allowed 7.75

Mill Products

Aluminum

(Cents per lb, base, subject to extras for quantity, gage, size, temper and finish)

Drawn tubing: 2 to 3 in. OD by 0.065 in. wall; 3S, 43.5¢; 52S-O, 67¢; 24S-T, 71¢; base, 30,000 lb.

Plate: ¼ in. and heavier; 2S, 3S, 21.2¢; 52S, 24.2¢ 61S, 23.8¢; 24S, 24S-AL, 24.2¢; 75S, 75-S-AL, 30.5¢; base, 30,000 lb.

Flat Sheet: 0.136-in. thickness; 2S, 3S, 23.7¢; 52S, 27.2¢; 61S, 24.7¢; 24S-O, 24S-OAL, 26.7¢; 75S-O, 75S-OAL, 32.7¢; base, 30,000 lb.

Extruded Solid Shapes: factor determined by dividing the perimeter of the shape by its weight per foot. For factor 1 through 4, 3S, 26¢; 14S, 32.5¢; 24S, 35¢; 53S, 61S, 28¢; 63S, 27¢; 75S 45.5¢; base, 30,000 lb.

Wire, Rod and Bar: screw machine stock, rounds, 17S-T, ¼ in., 29.5¢; ½ in., 37.5¢; 1 in., 26¢; 2 in., 24.5¢; hexagons, ¼ in., 35.5¢; ½ in., 30¢; 1 in., 2 in., 27¢; base, 5000 lb. *Rod:* 2S, 3S, 1¼ to 2½ in. diam. rolled, 23¢; cold-finished, 23.5¢ base, 30,000 lb. *Round Wire:* drawn, coiled, B & S gage 17-18; 2S, 3S, 33.5¢; 56S, 39.5¢ 10,000 lb base. B & S gage 00-1; 2S, 3S, 21¢; 56S, 30.5¢. B & S 15-16; 2S, 3S, 32.5¢; 56S, 38¢; base, 30,000 lb.

Magnesium

(Cents per lb f.o.b. mill. Base quantity 30,000 lb.)

Sheet and Plate: Ma. FSa. ¼ in., 54¢-56¢; 0.188 in., 56¢-58¢; B & S gage 8, 58¢-60¢; 10, 59¢-61¢; 14, 69¢-74¢; 16, 79¢-81¢; 18, 87¢-89¢; 22, $1.25-$1.31; 24, $1.71-$1.75.

Round Rod: M, diam, in., ¼ to ⅜, 47¢; ½ to ¾, 45¢ 1¼ to 2½, 43.5¢; 3½ to 5, 42.5¢. Other alloys higher.

Square, Hexagonal Bar: M, size across flats, in., ¼ to ⅜, 52.5¢; ½ to ¾, 47.5¢; 1¼ to 2½, 45¢; 3½ to 5, 44¢. Other alloys higher.

Solid Shapes, Rectangles: M, form factors, 1 to 4, 46¢; 11 to 13, 49¢; 20 to 22, 51.5¢; 29 to 31, 59.5¢; 38 to 40, 75.5¢; 47 to 49, 98¢. Other alloys higher.

Round Tubing: M, wall thickness, outside diam, in., 0.049 to 0.057, ¼ to 5/16, $1.21; 5/16 to ⅜, $1.12; ⅜ to 7/16, 97¢; 0.058 to 0.064, 7/16 to ½, 89¢; ½ to ⅝, 81¢; 0.065 to 0.082, ⅝ to ¾, 76¢; ¾ to 1, 72¢; 0.083 to 0.108, 1 to 2, 68¢; 0.165 to 0.219, 2 to 3, 59¢; 3 to 4, 57¢. Other alloys higher.

Nickel and Monel

(Cents per lb, f.o.b. mill)

	Nickel	Monel
Sheets, cold-rolled	54	43
No. 35 sheets	..	41
Strip, cold-rolled	60	44
Rod		
Hot-rolled	50	39
Cold-drawn	55	44
Angles, hot-rolled	50	39
Plates	52	41
Seamless tubes	83	71
Shot and blocks	...	31

Zinc

(Cents per lb, f.o.b. mill)

Sheet, l.c.l. 15.50
Ribbon, ton lots 14.50
Plates
Small 13.50
Large, over 12 in. 14.50

Copper, Brass, Bronze

(Cents per pound, f.o.b. mill effective June 11)

	Extruded Shapes	Rods	Sheets
Copper	33.53	....	33.68
Copper, hot-rolled	....	30.03	....
Copper, drawn	....	31.03	....
Low brass	34.04*	31.07	31.38
Yellow brass	32.39*	29.32	29.63
Red brass	34.65*	31.68	31.99
Naval brass	29.56	28.31	34.25
Leaded brass	27.98	24.39	30.13
Commercial bronze	35.52*	32.80	33.11
Manganese bronze	33.14	31.64	37.75
Phosphor bronze, 5 pct.	53.25*	52.25	52.00
Muntz metal	29.17	27.92	32.36
Everdur, Herculoy, Olympic, etc.	37.07	35.57	38.44
Nickel silver, 5 pct.	41.20	40.28	38.67
Architectural bronze	27.94	....	....

*Seamless tubing.

Scrap Metals

Brass Mill Scrap

(Lots of less than 15,000 lb.)

Cartridge brass turnings 14½
Loose yellow brass trimmings 15½

(Dealers' buying prices, f.o.b. New York in cents per pound.)

Copper and Brass

No. 1 heavy copper and wire 15½—16
No. 2 heavy copper and wire 14½—15
Light copper ..... 13 —13½
Auto radiators (unsweated). 8¼— 8¾
No. 1 composition ..... 11 —11½
No. 1 composition turnings.. 10½—11
Clean red car boxes..... 9 — 9½
Cocks and faucets ..... 8¾— 9¼
Mixed heavy yellow brass... 6½— 7
Old rolled brass ..... 7 — 7½
Brass pipe ..... 8¼— 8¾
New soft brass clippings .... 11 —11½
Brass rod ends ..... 8½— 9
No. 1 brass rod turnings ... 8 — 8½

Aluminum

Alum. pistons free of struts.. 3½— 4
Aluminum crankcases ..... 5½— 6
2S aluminum clippings ..... 8 — 8½
Old sheet & utensils ..... 5½— 6
Mixed borings and turnings.. — 2
Misc. cast aluminum ..... 5 — 5½
Dural clips (24S) ..... 4½— 5

Zinc

New zinc clippings ..... 5½— 6
Old zinc ..... 4¼— 4½
Zinc routings ..... 2½— 3
Old die cast scrap ..... 2½— 3

Nickel and Monel

Pure nickel clippings ..... 15½—17½
Clean nickel turnings ..... 14 —15
Nickel anodes ..... 16 —17
Nickel rod ends ..... 16 —17
New Monel clippings ..... 12 —13
Clean Monel turnings ..... 7 — 8
Old sheet Monel..... 10 —10½
Old Monel castings ..... 7½— 8
Inconel clippings ..... 8 — 8½
Nickel silver clippings, mixed 7½— 8
Nickel silver turnings, mixed 5½— 6

Lead

Soft scrap lead ..... 10¾—11¼
Battery plates (dry) ..... 5 — 5⅛

Magnesium Alloys

Segregated solids ..... 6½— 7
Castings ..... 4½— 5½

Miscellaneous

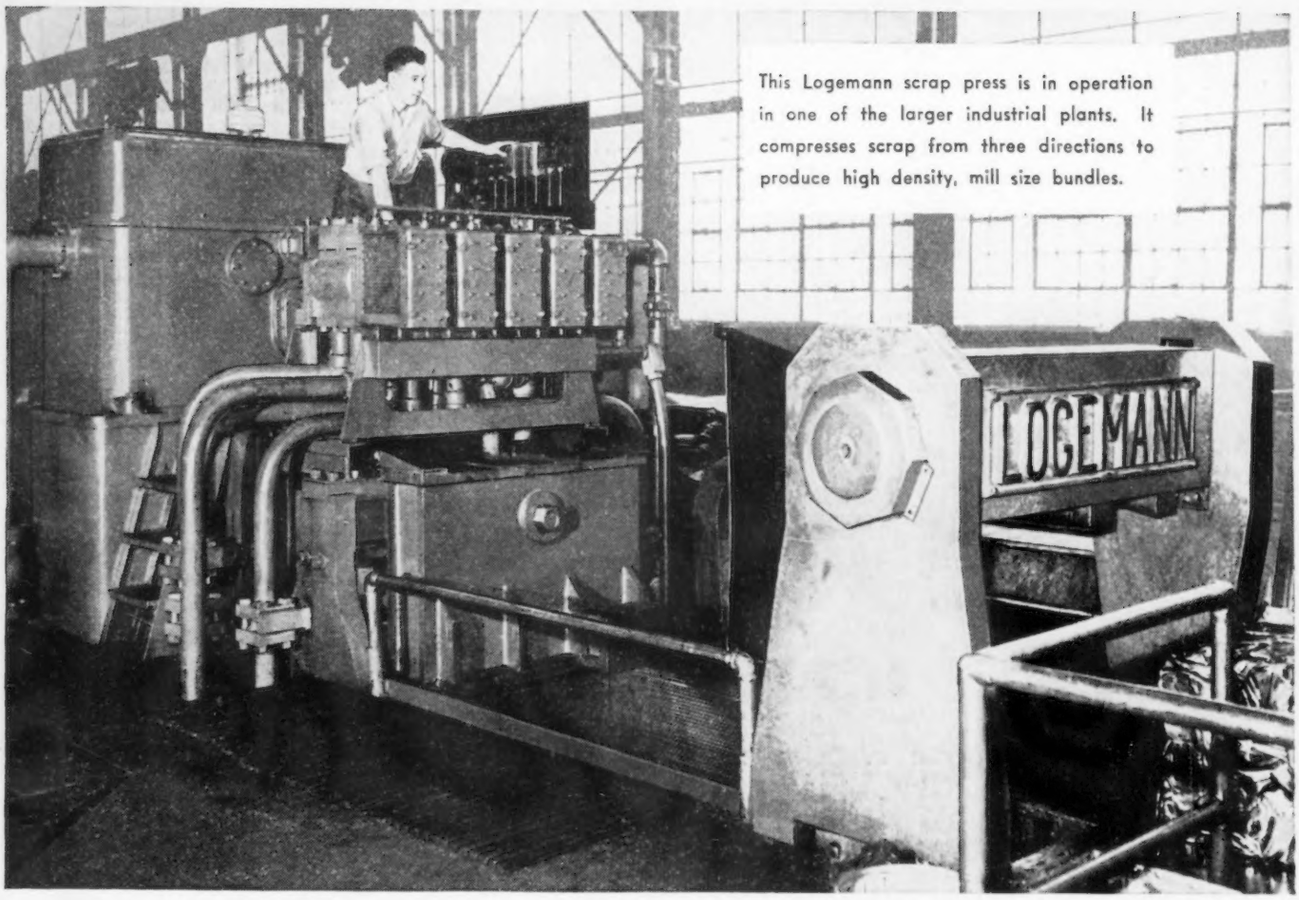
Block tin ..... 63 —65
No. 1 pewter ..... 48 —50
No. 1 auto babbitt ..... 38 —40
Mixed common babbitt ..... 11½—12
Solder joints ..... 13 —13½
Siphon tops ..... 38 —39
Small foundry type ..... 13 —13½
Monotype ..... 12 —12½
Lino and stereotype ..... 11½—12
Electrotype ..... 9½—10
New type shell cuttings ..... 11 —11½
Clean hand picked type shells 4½— 5
Lino and stereo dross ..... 5 — 5½
Electro dross ..... 3 — 3¼

Lead Products

(Cents per lb)

F.o.b. shipping point freight collect Freight equalized with nearest free delivery point.

Full lead sheets 18.25
Cut lead sheets 18.75
Lead pipe, manufacturing point ... 17.50
Lead traps and bends.....List +42%
Combination lead and iron bends and ferrules, also combination lead and iron ferrules ....List +42%
Lead wool 19.50



This Logemann scrap press is in operation in one of the larger industrial plants. It compresses scrap from three directions to produce high density, mill size bundles.

Self-contained . . . . . }
Triple Compression . . }
Automatically Controlled }

LOGEMANN SCRAP PRESSES

handle high tonnages with minimum labor . . . *at low cost!*

●

LOGEMANN METAL BALERS

. . . are built in a large range of sizes to meet specific conditions. Let Logemann's engineering service help you arrive at the most efficient and economical way of handling your scrap.

●

The compact unit illustrated is completely self-contained with oil tank and pump located directly over the press . . . utilizing the advantages of short pipe lines. Automatic controls, mounted in front of pump, give the operator full visibility at all times. Controls operate rams successively within a single rigid box. There is no complex construction which means there is *no need for specially-trained maintenance crews.*

Both two-ram and three-ram models are available with automatic controls or for manual manipulation.

Logemann Bros. Co. have specialized in the production of scrap metal presses for sheet mills, stamping plants, scrap yards, and metal manufacturing plants of all types for nearly 75 years. Write for full information—please state the nature of your scrap and tonnage.

LOGEMANN BROTHERS COMPANY

3164 W. Burleigh Street ● Milwaukee 10, Wisconsin

SCRAP

Pressure Remains But Testing Deferred

New York

• • • **The scrap market** is now in one of its most hectic periods. Confusion reigns supreme in the minds of buyers and sellers alike. A determined effort to bring prices down is in the offing. It is recalled that steel scrap buyers got themselves badly tangled in cross hauling and raiding of each other's markets this spring. Buyers saw the error of their ways and the market was straightened out by April. Now that a somewhat similar state of affairs prevails, the same cure will again be tried. It may work—but all concerned are keeping their eyes on each other, fearing some desperate producer will make a misstep.

The period of price testing which had been anticipated previously has been delayed somewhat by the action of one larger consumer in giving notice that outstanding high price orders will be closed on Nov. 22. Unless other consumers come into the market for significant tonnages before that time, it appears that the lower offers being made by the mills will not be thoroughly tested until late this month.

In Buffalo, the only important consuming center where there are not large high price orders on the books, the battle to restrain scrap prices is already well under way. At midweek, dealers there were ignoring the offers being made currently by mills, and choosing to bide their time.

While the battle rages on No. 1 steelmaking scrap grades, the price of railroad scrap in some areas slipped, and cast grades generally retained their strength. Scrap supplies remained very tight all over the country.

THE IRON AGE heavy melting steel scrap composite price remained stable at $41.50 this week, as no changes were made in the No. 1 prices at Chicago, Pittsburgh, and Philadelphia.

•

PITTSBURGH — Major interests were still out of the market early this week. The trade has been informed that the $43 open hearth steel orders put out by a large buyer will be terminated on Nov. 22, the expiration date of the 30-day period in the original orders. The $40 orders will remain open. Unless other buyers come into the market here before that time, price testing will be deferred until then. It is apparently hoped that news of the end of $43 business will permit brokers to cover $40 orders at a profit. At present they are paying dealers up to $42.50. R. R. heavy melting steel sold off several dollars based on latest allocations to steel mills but rails are stronger. Some of this heavy melting scrap went to foundries outside of this district at prices up to $47. Cupola cast, malleable and low phos each moved $1 higher this week.

•

CHICAGO—New business is again at a standstill with sellers resisting the mills offers at $39.00. The only exception as far as activity is concerned are special deals the details of which remain obscure. Railroad lists continued to bring high prices and the foundries report no weakness in the cast or malleable items. Generally the opinion is that the market is still decidedly strong, and that all the talk of Washington being behind the last drop in prices remains unconfirmed.

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PHILADELPHIA — There were no changes in the prices of heavy melting or other grades last week. New orders for heavy melting were placed during the week at $43, yet one major factor in the market is reported to be offering $38.50. There are no takers at this figure. Shipments are reported to be in fair volume, but at this rate there can be no significant improvement in mill inventories.

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CLEVELAND — There has been very little change in the open hearth market, and demand continues strong with supply weak. Brokers are paying $43.50 to cover on the $43.00 orders. Some mills have already gone back on the old OPA system of differentials, and their brokers are buying on this basis, or local buying price f.o.b. shipping point. The market for specialty grades is hotter than a two dollar pistol, and is getting a lot of attention from dealers and brokers at the moment.

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DETROIT—Although the Detroit market was stronger at midweek there were no transactions reported that would justify a higher market price. Several brokers reported they were buying scrap in very small quantities at present quotations, but scrap flow it was admitted was limited by dealers who are uninterested in present prices or who are building an inventory allegedly for tax purposes. Earmarked scrap sold this month went for $35.32, the highest price yet reported. Cast grades are very strong with scattered sales at more than $50 for choice grades reported. Based on present tightness of the market the previous price range of $1 for most grades of steel has been reduced to 50 cents.

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BUFFALO—The market for open hearth scrap was still deadlocked this week. Mills stood pat on their offers of $39.25 delivered, while sellers held back because of strength outside the local area. The movement of open market stuff was light. But trade sources reported a sharp increase in reciprocal business, which tended to further confuse the issue. Cast scrap jumped another $2 with sales of No. 1 cupola at $45 to $47 and low phos sold $1 higher at $44 to $45. Malleable jumped $10 a ton on a small transaction.

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NEW YORK — The market here remained quiet pricewise, although there was some indication of strength due to anxiety on the part of brokers to complete orders negotiated before consumers went out of the market last month. Some small tonnages moved at above the $39.00 top, but no representative quantities were involved. A New Jersey foundry came into the market for cast grades, to hold most of this material in the district.

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BOSTON—Brokers and steel mills are apparently as far apart as ever on new business based at $31 a ton for heavy steel. Brokers, however, are covering a few old orders at $35-36 a ton, and one has bid as high as $38 to a Providence yard, but the latter had nothing to sell. Turnings and borings, generally at $28.50, and shoveling material at $30.50, have figured in recent sales. Cast supplies remain short, prices firm and unchanged, and demand active.

•

ST. LOUIS—Steel mills in this district were able to buy a limited fixed tonnage of No. 2 heavy melting steel at their price of $38 for November shipment. Brokers' orders were accepted and the steel delivered on that basis. Others accepted orders conditioned upon being able to deliver at that price, an unusual procedure. Foundry grades have advanced from $1 to $3 a ton, the shortage of pig iron being a factor in causing the increases.

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BIRMINGHAM—The scrap market is very quiet here. Consumers still are trying to get open hearth grades for $35 per ton and dealers still are refusing to ship at that price. The relatively small tonnages moving are on old orders.

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CINCINNATI—The market here stays much the same as it has been for the past several weeks. Hikes in prices are evident. The hue and cry is now that there is a great demand for scrap with none in the yards to fill the needs. Mills are trying, by staying out of the market to some extent, to keep the top order price at $39.50. Recent foundry purchases have made substantial increases in cast grades.

•

TORONTO—Price situation remains unchanged in the Canadian scrap markets. Steel scrap is under ceiling control, while cast scrap has something of a price spread ranging from $38 to $40 per ton delivered to consuming plants. No established prices have been set for stove plate and malleable scrap, both of which are virtually off the market. No improvement is reported in offerings and domestic supply is reported at less than 35 pct of requirements. Little or no scrap is coming from farm communities, but industrial plants continue to make regular offerings.

PITTSBURGH

Per gross ton delivered to consumer†:

No. 1 hvy. melting	$40.00 to $45.00
RR. hvy. melting	40.50 to 41.00
No. 2 hvy. melting	40.00 to 45.00
RR. scrap rails	48.00 to 48.50
Rails 2 ft. and under	52.00 to 52.50
No. 1 comp'd bundles	40.00 to 45.00
Hand bdld. new shts.	40.00 to 45.00
Hvy. axle turn.	41.50 to 42.00
Hvy. steel forge turn.	41.50 to 42.00
Mach. shop turn.	35.00 to 35.50
Shoveling turn.	36.50 to 37.00
Mixed bor. and turn.	35.00 to 35.50
Cast iron borings	35.50 to 36.00
No. 1 cupola cast.	49.00 to 50.00
Hvy. breakable cast.	39.00 to 40.00
Malleable	56.00 to 57.00
RR. knuck. and coup.	51.00 to 52.00
RR. coil springs	51.00 to 52.00
RR. leaf springs	51.00 to 52.00
Rolled steel wheels	51.00 to 52.00
Low phos.	48.00 to 49.00

†See box on this page.

CHICAGO

Per gross ton delivered to consumer:

No. 1 hvy. melting	$39.00 to $40.00
No. 2 hvy. melting	39.00 to 40.00
No. 1 bundles	39.00 to 40.00
No. 2 dealers' bundles	39.00 to 40.00
Bundled mach. shop turn.	39.00 to 40.00
Galv. bundles	37.00 to 38.00
Mach. shop turn.	35.00 to 36.00
Short shov. turn.	36.00 to 38.00
Cast iron borings	36.00 to 37.00
Mix. borings & turn.	35.00 to 36.00
Low phos, hvy. forge	47.50 to 48.00
Low phos, plates	45.00 to 45.50
No. 1 RR. hvy. melt.	45.00 to 46.00
Rerolling rails	54.00 to 55.00
Miscellaneous rails	49.50 to 50.00
Angles & splice bars	50.00 to 51.00
Locomotive tires, cut	49.00 to 50.00
Cut bolster & side frames	48.00 to 48.50
Standard stl. car axles	53.00 to 55.00
No. 3 steel wheels	47.50 to 48.00
Couplers & knuckles	48.50 to 49.00
Rails 2 ft. and under	54.50 to 55.00
Malleable	65.00 to 66.00
No. 1 mach. cast.	53.00 to 54.00
No. 1 agricul. cast.	49.00 to 50.00
Hvy. breakable cast.	41.00 to 43.00
RR. grate bars	48.00 to 49.00
Cast iron brake shoes	48.00 to 49.00
Cast iron carwheels	55.50 to 56.50

CINCINNATI

Per gross ton delivered to consumer:

No. 1 hvy. melting	$38.00 to $40.00
No. 2 hvy. melting	38.00 to 40.00
No. 1 bundles	38.00 to 40.00
No. 2 bundles	38.00 to 40.00
Mach. shop turn.	33.00 to 34.00
Shoveling turn.	33.00 to 34.00
Cast iron borings	30.00 to 31.00
Mixed bor. & turn.	30.00 to 31.00
Low phos. plate	49.00 to 50.00
No. 1 cupola cast.	51.00 to 53.00
Hvy. breakable cast.	42.00 to 43.00
Scrap rails	47.00 to 48.00

BOSTON

Dealers' buying prices per gross ton, f.o.b. cars:

No. 1 hvy melting	$35.00 to $36.00
No. 2 hvy. melting	35.00 to 36.00
Nos. 1 and 2 bundles	35.00 to 36.00
Busheling	35.00 to 36.00
Shoveling turn.	30.50
Machine shop turn.	28.50
Mixed bor. & turn.	28.50
Cl'n cast. chem. bor.	34.00
No. 1 machinery cast.	43.00 to 44.00
No. 2 machinery cast.	43.00 to 44.00
Heavy breakable cast.	39.00 to 40.00
Stove plate	39.00 to 40.00

DETROIT

Per gross ton, brokers' buying prices, f.o.b. cars:

No. 1 hvy. melting	$34.75 to $35.25
No. 2 hvy. melting	34.75 to 35.25
No. 1 bundles	34.75 to 35.25
New busheling	34.75 to 35.25
Flashings	34.75 to 35.25
Mach. shop turn.	30.50 to 31.00
Shoveling turn.	31.50 to 32.00
Cast iron borings	31.50 to 32.00
Mixed bor. & turn.	31.50 to 32.00
Low phos. plate	41.75 to 42.25
No. 1 cupola cast	45.00 to 46.00
Hvy. breakable cast.	39.00 to 40.00
Stove plate	37.00 to 38.00
Automotive cast.	45.00 to 46.00

Going prices as obtained in the trade by THE IRON AGE, based on representative tonnages.

PHILADELPHIA

Per gross ton delivered to consumer:

No. 1 hvy. melting	$42.00 to $43.00
No. 2 hvy. melting	42.00 to 43.00
No. 1 bundles	42.00 to 43.00
No. 2 bundles	42.00 to 43.00
Mach. shop turn.	33.00 to 34.00
Shoveling turn.	33.00 to 34.00
Mixed bor. & turn.	33.00 to 34.00
Clean cast chemical bor.	39.00 to 41.00
No. 1 machinery cast.	52.00 to 54.00
No. 1 mixed yard cast.	49.00 to 50.00
Hvy. breakable cast.	48.00 to 49.00
Clean auto cast.	52.00 to 54.00
Hvy. axle forge turn.	42.00 to 43.00
Low phos. plate	47.00 to 48.00
Low phos. punchings	47.00 to 48.00
Low phos. bundles	46.00 to 47.00
RR. steel wheels	48.00 to 49.00
RR. coil springs	48.00 to 49.00
RR. malleable	58.00 to 60.00

Going prices as obtained in the trade by THE IRON AGE, based on representative tonnages. Where substantial tonnages of open hearth grades come into a consuming district from outside of that district, the upper range of the price quoted here is the representative average delivered price of the bulk of this incoming material; the lower range shows the price being paid for scrap originating within the consuming district.

ST. LOUIS

Per gross ton delivered to consumer:

No. 1 hvy. melting	$40.50 to $41.00
No. 2 hvy. melting	38.00 to 39.00
Bundled sheets	38.00 to 39.00
Mach. shop turn.	32.00 to 33.00
Locomotive tires, uncut	45.00 to 46.00
Mis. std. sec. rails	48.00 to 49.00
Rerolling rails	55.00 to 56.00
Steel angle bars	47.00 to 48.00
Rails 3 ft. and under	51.00 to 52.00
RR. steel springs	46.00 to 47.00
Steel car axles	46.00 to 48.00
Grate bars	43.00 to 44.00
Brake shoes	45.00 to 46.00
Malleable	63.00 to 64.00
Cast iron car wheels	46.00 to 47.00
No. 1 machinery cast.	46.00 to 47.00
Hvy. breakable cast.	39.00 to 40.00

BIRMINGHAM

Per gross ton delivered to consumer:

No. 1 hvy. melting	$37.00 to $38.00
No. 2 hvy. melting	37.00 to 38.00
No. 2 bundles	37.00 to 38.00
No. 1 busheling	37.00 to 38.00
Long turnings	23.00 to 24.00
Shoveling turnings	25.00 to 26.00
Cast iron borings	24.00 to 25.00
Bar crops and plate	38.00 to 38.50
Structural and plate	38.00 to 38.50
No. 1 cupola cast.	46.00 to 47.00
Stove plate	43.00 to 44.00
No. 1 RR. hvy. melt.	36.00 to 37.00
Steel axles	38.00 to 39.00
Scrap rails	37.50 to 38.00
Rerolling rails	48.00 to 49.00
Angles & splice bars	40.00 to 41.00
Rails 3 ft. & under	40.00 to 41.00
Cast iron carwheels	35.00 to 36.00

YOUNGSTOWN

Per gross ton delivered to consumer:

No. 1 hvy. melting	$42.50 to $43.00
No. 2 hvy. melting	42.50 to 43.00
Mach. shop turn.	36.00 to 36.50
Short shov. turn.	37.00 to 37.50
Cast iron borings	36.00 to 36.50
Low phos	46.00 to 46.50

NEW YORK

Brokers' buying prices per gross ton, on cars:

No. 1 hvy. melting	$38.00 to $39.00
No. 2 hvy. melting	38.00 to 39.00
No. 2 bundles	38.00 to 39.00
Comp. galv. bundles	36.00 to 37.00
Mach. shop turn.	30.00 to 31.00
Mixed bor. & turn.	30.00 to 31.00
Shoveling turn.	31.00 to 32.00
No. 1 cupola cast.	43.50 to 44.00
Hvy. breakable cast.	43.50 to 44.00
Charging box cast.	43.50 to 44.00
Stove plate	43.50 to 44.00
Clean auto cast.	43.50 to 44.00
Unstrip. motor blks.	40.50 to 41.50
Cl'n chem. cast bor.	33.50 to 34.50

BUFFALO

Per gross ton delivered to consumer:

No. 1 hvy. melting	$39.00 to $40.00
No. 2 hvy. melting	39.00 to 40.00
No. 1 bundles	39.00 to 40.00
No. 2 bundles	39.00 to 40.00
No. 1 busheling	39.00 to 40.00
Mach. shop turn.	32.50 to 33.50
Shoveling turn.	34.50 to 35.50
Cast iron borings	31.50 to 32.50
Mixed bor. & turn.	31.50 to 32.50
No. 1 cupola cast.	45.00 to 47.00
Charging box cast.	41.00 to 43.00
Stove plate	44.00 to 45.00
Clean auto cast.	43.00 to 45.00
RR. Malleable	60.00 to 65.00
Small indl. malleable	50.00 to 52.00
Low phos. plate	44.00 to 45.00
Scrap rails	47.00 to 48.00
Rails 3 ft. & under	50.00 to 52.00
RR. steel wheels	46.00 to 48.00
Cast iron carwheels	46.00 to 48.00
RR. coil & leaf spgs.	46.00 to 48.00
RR. knuckles & coup.	46.00 to 48.00

CLEVELAND

Per gross ton delivered to consumer:†

No. 1 hvy. melting	$39.50 to $42.50
No. 2 hvy. melting	39.50 to 42.50
No. 1 bundles	39.50 to 42.50
No. 2 bundles	39.50 to 42.50
No. 1 busheling	39.50 to 42.50
Drop forge flashings	39.50 to 42.50
Mach. shop turn.	35.50 to 36.00
Shoveling turn.	36.00 to 36.50
Steel axle turn.	39.00 to 42.50
Cast iron borings	36.00 to 36.50
Mixed bor. & turn.	36.00 to 36.50
Low phos.	43.00 to 43.50
No. 1 machinery cast.	50.00 to 52.00
Malleable	63.00 to 65.00
RR. Cast.	53.00 to 55.00
Railroad grate bars	42.00 to 44.00
Stove plate	48.00 to 50.00
RR. hvy. melting	40.50 to 41.00
Rails 3 ft. & under	53.00 to 54.00
Rails 18 in. & under	55.00 to 56.00

†See box on this page.

SAN FRANCISCO

Per gross ton f.o.b. shipping point:

No. 1 hvy. melting	$25.00
No. 2 hvy. melting	25.00
No. 2 bales	25.00

Per gross ton delivered to consumer:

No. 3 bales	$19.50
Mach. shop turn.	16.00
Elec. furn. 1 ft. und	$32.00 to 34.00
No. 1 cupola cast.	32.00 to 33.00
RR. hvy. melting	26.00

LOS ANGELES

Per gross ton delivered to consumer:

No. 1 hvy. melting	$25.50
No. 2 hvy. melting	25.50
No. 1 bales	25.50
No. 2 bales	25.50
No. 3 bales	19.50
Mach. shop turn.	17.50
No. 1 cupola cast.	$35.00 to 36.00
RR. hvy. melting	26.50

SEATTLE

Per gross ton delivered to consumer:

No. 1 & No. 2 hvy. melt.	$24.00
Elec. furn. 1 ft. and und.	27.50
No. 1 cupola cast.	27.50
RR. hvy. melting	25.00

HAMILTON, ONT.

Per gross ton delivered to consumer:
Cast grades f.o.b. shipping point

Heavy melting	$22.00*
No. 1 bundles	22.00*
No. 2 bundles	21.50*
Mechanical bundles	20.00*
Mixed steel scrap	19.00*
Mixed borings and turnings	17.00*
Rails, remelting	23.00*
Rails, rerolling	26.00*
Bushelings	17.00*
Bushelings, new fact., prep'd	21.00*
Bushelings, new fact., unprep'd	16.00*
Short steel turnings	17.00*
No. 1 cast.	36.00 to 40.00

*Ceiling Price.

Comparison of Prices . .

Advances over past week in Heavy Type, declines in *Italics*. Prices are f.o.b. major basing points. The various basing points for finished and semifinished steel are listed in the detailed price tables.

Flat-Rolled Steel: (cents per pound)	Nov. 11, 1947	Nov. 4, 1947	Oct. 14, 1947	Nov. 12, 1946
Hot-rolled sheets	2.80	2.80	2.80	2.425
Cold-rolled sheets	3.55	3.55	3.55	3.275
Galvanized sheets (10 ga.)	3.95	3.95	3.95	4.05*
Hot-rolled strip	2.80	2.80	2.80	2.45
Cold-rolled strip	3.55	3.55	3.55	3.05
Plates	2.95	2.95	2.95	2.50
Plates wrought iron	6.85	6.85	6.85	4.112
Stain's c-r strip (No. 302) *24 gage	30.50	30.50	30.50	30.30
Tin and Terneplate: (dollars per base box)				
Tinplate, standard cokes.	$5.75	$5.75	$5.75	$5.00
Tinplate, electro (0.50 lb)	5.05	5.05	5.05	4.50
Special coated mfg. ternes	4.90	4.90	4.90	4.30
Bars and Shapes: (cents per pound)				
Merchant bars	2.90	2.90	2.90	2.50
Cold-finished bars	3.55	3.55	3.55	3.10
Alloy bars	3.30	3.30	3.30	2.92
Structural shapes	2.80	2.80	2.80	2.35
Stainless bars (No. 302).	26.00	26.00	26.00	25.97
Wrought iron bars	7.15	7.15	7.15	4.76
Wire and Wire Products: (cents per pound)				
Bright wire	3.55	3.55	3.55	3.05
Wire nails	4.25	4.25	4.25	3.75
Rails: (dollars per 100 lb)				
Heavy rails	$2.75	$2.75	$2.75	$43.39*
Light rails	3.10	3.10	3.10	49.18*
*per net ton				
Semifinished Steel: (dollars per gross ton)				
Rerolling billets	$45.00	$45.00	$45.00	$39.00
Sheet bars	66.00	66.00	66.00	38.00
Slabs, rerolling	45.00	45.00	45.00	39.00
Forging Billets	55.00	55.00	55.00	47.00
Alloy blooms, billets, slabs	66.00	66.00	66.00	58.43
Wire Rods and Skelp: (cents per pound)				
Wire rods	2.80	2.80	2.80	2.30
Skelp	2.60	2.60	2.60	2.05

Pig Iron: (per gross ton)	Nov. 11, 1947	Nov. 4, 1947	Oct. 14, 1947	Nov. 12, 1946
No. 2, foundry, Phila.	*$40.97*	$41.36	$41.36	$30.43
No. 2, Valley furnace	36.50	36.50	36.50	28.50
No. 2, Southern Cin'ti	40.24	40.24	40.24	27.80
No. 2, Birmingham	34.88	34.88	34.88	24.88
No. 2, foundry, Chicago†	36.00	36.00	36.00	28.50
Basic del'd Philadelphia	*40.47*	40.86	40.86	29.93
Basic, Valley furnace	36.00	36.00	36.00	28.00
Malleable, Chicago†	36.50	36.50	36.50	28.50
Malleable, Valley	36.50	36.50	36.50	28.50
Charcoal, Chicago	56.04	56.04	49.49	42.34
Ferromanganese‡	145.00	145.00	145.00	135.00

† The switching charge for delivery to foundries in the Chicago district is $1 per ton.
‡ For carlots at seaboard.

Scrap: (per gross ton)	Nov. 11, 1947	Nov. 4, 1947	Oct. 14, 1947	Nov. 12, 1946
Heavy melt'g steel, P'gh.	$42.50	$42.50	$40.25	$25.25
Heavy melt'g steel, Phila.	42.50	42.50	39.50	24.00
Heavy melt'g steel, Ch'go	39.50	39.50	38.75	24.00
No. 1, hy. comp. sheet, Det.	34.75	34.75	34.50	17.32
Low phos. Youngs'n	46.25	46.25	46.25	22.50
No. 1, cast, Pittsburgh	49.50	48.50	44.25	29.00
No. 1, cast, Philadelphia	53.00	53.00	49.50	35.00
No. 1, cast, Chicago	53.50	52.50	50.00	29.00
Coke, Connellsville: (per net ton at oven)				
Furnace coke, prompt	$12.50	$12.50	$12.00	$8.75
Foundry coke, prompt	14.00	14.00	14.00	8.50
Nonferrous Metals: (cents per pound to large buyers)				
Copper, electro., Conn.	21.50	21.50	21.50	17.50
Copper, Lake, Conn.	21.625	21.625	21.625	17.50
Tin, Straits, New York	80.00	80.00	80.00	52.00
Zinc, East St. Louis	10.50	10.50	10.50	10.50
Lead, St. Louis	14.80	14.80	14.80	10.35
Aluminum, virgin	15.00	15.00	15.00	15.00
Nickel, electrolytic	37.67	37.67	37.67	35.00
Magnesium, ingot	20.50	20.50	20.50	20.50
Antimony, Laredo, Tex.	33.00	33.00	33.00	23.50

Composite Prices . .

In accordance with usual practice, THE IRON AGE finished steel composite price has been revised this week, following receipt of third quarter 1947 shipment data. While no price changes have been made since Aug. 5, 1947, the change in the pattern of shipments produces a composite price slightly lower than that of 3.1914¢, the figure used last week which was based on second quarter 1947 shipments. Shipment data by American Iron & Steel Institute.

	FINISHED STEEL	PIG IRON	SCRAP STEEL
Nov. 11, 1947	3.18925¢ per lb.	$37.06 per gross ton	$41.50 per gross ton
One week ago	3.18925¢ per lb.	$36.96 per gross ton	$41.50 per gross ton
One month ago	3.18925¢ per lb.	$36.96 per gross ton	$39.50 per gross ton
One year ago	2.70711¢ per lb.	$28.13 per gross ton	$24.42 per gross ton

	FINISHED STEEL HIGH	FINISHED STEEL LOW	PIG IRON HIGH	PIG IRON LOW	SCRAP STEEL HIGH	SCRAP STEEL LOW
1947	3.19141¢ Aug. 5	2.87118¢ Jan. 7	$37.35 Aug. 19	$30.14 Jan. 7	$42.58 Oct. 28	$29.50 May 20
1946	2.83599¢ Dec. 31	2.54490¢ Jan. 1	30.14 Dec. 10	25.37 Jan. 1	31.17 Dec. 24	19.17 Jan. 1
1945	2.44104¢ Oct. 2	2.38444¢ Jan. 2	25.37 Oct. 23	23.61 Jan. 2	19.17 Jan. 2	18.92 May 22
1944	2.30837¢ Sept. 5	2.21189¢ Oct. 5	$23.61	$23.61	19.17 Jan. 11	15.76 Oct. 24
1943	2.29176¢	2.29176¢	23.61	23.61	$19.17	$19.17
1942	2.28249¢	2.28249¢	23.61	23.61	19.17	19.17
1941	2.43078¢	2.43078¢	$23.61 Mar. 20	$23.45 Jan. 2	$22.00 Jan. 7	$19.17 Apr. 10
1940	2.30467¢ Jan. 2	2.24107¢ Apr. 16	23.45 Dec. 23	22.61 Jan. 2	21.83 Dec. 30	16.04 Apr. 9
1939	2.35367¢ Jan. 3	2.26689¢ May 16	22.61 Sept. 19	20.61 Sept. 12	22.50 Oct. 3	14.08 May 16
1938	2.58414¢ Jan. 4	2.27207¢ Oct. 18	23.25 June 21	19.61 July 6	15.00 Nov. 22	11.00 June 7
1937	2.58414¢ Mar. 9	2.32263¢ Jan. 4	23.25 Mar. 9	20.25 Feb. 16	21.92 Mar. 30	12.67 June 9
1936	2.32263¢ Dec. 28	2.05200¢ Mar. 10	19.74 Nov. 24	18.73 Aug. 11	17.75 Dec. 21	12.67 June 8
1935	2.07642¢ Oct. 1	2.06492¢ Jan. 8	18.84 Nov. 5	17.83 May 14	13.42 Dec. 10	10.33 Apr. 29
1934	2.15367¢ Apr. 24	1.95757¢ Jan. 2	17.90 May 1	16.90 Jan. 27	13.00 Mar. 13	9.50 Sept. 25
1933	1.95578¢ Oct. 3	1.75836¢ May 2	16.90 Dec. 5	13.56 Jan. 3	12.25 Aug. 8	6.75 Jan. 3
1932	1.89196¢ July 5	1.83901¢ Mar. 1	14.81 Jan. 5	13.56 Dec. 6	8.50 Jan. 12	6.43 July 5
1931	1.99626¢ Jan. 13	1.86586¢ Dec. 29	15.90 Jan. 6	14.79 Dec. 15	11.33 Jan. 6	8.50 Dec. 29
1930	2.25488¢ Jan. 7	1.97319¢ Dec. 9	18.21 Jan. 7	15.90 Dec. 16	15.00 Feb. 18	11.25 Dec. 9
1929	2.31773¢ May 28	2.26498¢ Oct. 29	18.71 May 14	18.21 Dec. 17	17.58 Jan. 29	14.08 Dec. 8

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold-rolled sheets and strip, representing major portion of finished steel shipments. Index recapitulated in Aug. 28, 1941, issue.

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

Iron and Steel Prices . . .

Steel prices shown here are f.o.b. basing points in cents per pound or dollars per gross ton. Extras apply. Delivered prices do not reflect 3 pct tax on freight. Industry practice has discontinued arbitrary f.o.b. prices at Gulf and Pacific Ports. Space limitations prevent quotation of delivered prices at major ports. (1) Commercial quality sheet grade; primes, 25¢ above base. (2) Commercial quality grade. (3) Widths up to 12-in. inclusive. (4) 0.25 carbon and less. (5) Applies to certain width and length limitations. (6) For merchant trade. (7) For straight length material only from producers to fabricators. (8) Also shafting. For quantities of 40,000 lb & over, (9) Carload lot in manufacturing trade. (10) Delivered Los Angeles only. (12) Produced to dimensional tolerances in AISI Manual Sec. 6. (13) Delivered San Francisco only: includes 3 pct freight tax. (14) Delivered Kaiser Co. prices: includes 3 pct freight tax. (15) to 0.035 to 0.075 in. thick by ¾ to 3½ in. wide. (16) Spot market as high as $92 gross ton or higher. (17) Delivered Los Angeles: add ½¢ per 100 lb for San Francisco. (18) Slab prices subject to negotiation in most cases. Some producers charge (19) $2 more, (21) $1 more. Some producers charge (22) 0.05¢ less, (23) 0.10¢ less, (24) 0.20¢ less.

Basing Points	Pitts-burgh	Chicago	Gary	Cleve-land	Birm-ingham	Buffalo	Youngs-town	Spar-rows Point	Granite City	Middle-town, Ohio		San Franc'co, Los Angeles, Seattle	DELIVERED TO Detroit	New York	Phila-delphia
INGOTS Carbon, rerolling	($36.00 f. o. b. mill) (Spot market as high as $80 gross ton)														
Carbon, forging	$46.00														
Alloy	$56.00									(Canton = $56.00)					
BILLETS, BLOOMS, SLABS Carbon, rerolling [18]	$45.00[19]	$45.00[19]	$45.00[19]	$47.00	$45.00[19]	$45.00[19]							$48.00[19]		
Carbon, forging billets	$55.00	$55.00	$55.00	$55.00	$55.00	$55.00							$58.00		
Alloy	$66.00	$66.00				$66.00	(Bethlehem, Massillon, Canton = $66.00)						$69.00		
SHEET BARS[16]							$66.00								
PIPE SKELP	2.60¢[21]	2.65¢					2.60¢[21]	2.60¢							
WIRE RODS	2.80¢[21]	2.80¢[21]		2.80¢[21]	2.85¢		(Worcester = 2.90¢[21])					3.52¢[13]			
SHEETS Hot-rolled	2.80¢	2.80¢	2.80¢	2.80¢	2.80¢	2.80¢	2.80¢	2.80¢	3.175¢	(Ashland, Ky. = 2.80¢)		3.54[17]¢	2.95¢	3.12¢	3.02¢
Cold-rolled[1]	3.55¢	3.55¢	3.55¢	3.55¢		3.55¢	3.55¢		3.65¢	3.55¢			3.70¢	4.00¢	3.97¢
Galvanized (10 gage)	3.95¢[23]	3.95¢[23]	3.95¢[23]		3.95¢[23]		3.95¢	3.95¢	4.05¢	3.95¢	(Ashland = 3.95¢)	4.62¢[17]		4.27¢	4.17¢
Enameling (12 gage)	3.95¢[22]	3.95¢[22]	3.95¢[22]	3.95¢			3.95¢		4.05¢	3.95¢			4.10¢[22]	4.42¢	4.37¢
Long ternes [2] (10 gage)	4.05¢[24]	4.05¢[24]	3.85¢											4.52¢	4.47¢
STRIP Hot-rolled [3]	2.80¢	2.80¢	2.80¢	2.80¢[15]	2.80¢		2.80¢					3.60¢[17]	2.95¢	3.27¢	3.22¢
Cold-rolled [4]	3.55¢	3.65¢		3.55¢			3.55¢			(Worcester = 3.75¢)			3.70¢	4.02¢	3.97¢
Cooperage stock	3.10¢	3.10¢			3.10¢		3.10¢							3.57¢	
TINPLATE Standard cokes, base box	$5.75	$5.75	$5.75		$5.85			$5.85	$5.85	(Warren, Ohio = $5.75)				$6.175	$6.074
Electro, box 0.25 lb.	Deduct 90¢ from standard coke base box price.														
Electro, box 0.50 lb.	Deduct 70¢ from standard coke base box price.														
Electro, box 0.75 lb.	Deduct 50¢ from standard coke base box price.														
BLACKPLATE, 29 gage[5]	3.90¢	3.90¢	3.90¢		4.00¢			4.00¢	4.00¢					4.32¢	4.22¢
BLACKPLATE, CANMAKING 55 lb. to 70 lb.	Deduct $1.55 from standard coke base box.														
75 lb. to 95 lb.	Deduct $1.65 from standard coke base box.														
100 lb. to 118 lb.	Deduct $1.55 from standard coke base box.														
TERNES, MFG., Special coated	Deduct 85¢ from standard coke base box price.														
BARS Carbon steel	2.90¢	2.90¢	2.90¢	2.90¢	2.90¢	2.90¢	2.90¢					3.625¢[17]	3.05¢	3.35¢	3.32¢
Rail steel[6]	Subject to negotiation because of fluctuating scrap prices.														
Reinforcing (billet)[7]	2.75¢	2.75¢	2.75¢	2.75¢	2.75¢	2.75¢	2.75¢	2.75¢				3.325¢[17]		3.07¢	2.97¢
Reinforcing (rail)	Subject to negotiation because of fluctuating scrap prices.														
Cold-finished[8]	3.55¢	3.55¢	3.55¢	3.55¢		3.55¢							3.70¢	4.00¢	3.97¢
Alloy, hot-rolled	3.30¢	3.30¢				3.30¢	3.30¢	(Bethlehem, Massillon, Canton = 3.30¢)					3.45¢		3.45¢
Alloy, cold-drawn	4.10¢	4.10¢	4.10¢	4.10¢		4.10¢							4.25¢		
PLATE Carbon steel[12]	2.95¢	2.95¢	2.95¢	2.95¢	2.95¢		2.95¢	(Coatesville = 3.15¢, Claymont = 3.15¢, Geneva, Utah = 2.95¢)				3.76¢[14]	3.10¢) 3.27¢		3.17¢
Floor plates	4.20¢	4.20¢												4.67¢	4.62¢
Alloy	3.80¢	3.80¢			(Coatesville = 4.50¢)									4.27¢	4.22¢
SHAPES, Structural	2.80¢	2.80¢	2.80¢		2.80¢	2.80¢	(Geneva, Utah = 3.95¢, Bethlehem = 2.80¢)					3.43¢[10]		3.02¢	2.95¢
SPRING STEEL, C-R 0.08 to 0.40 carbon	3.55¢			3.55¢			(Worcester = 3.75¢)								
0.41 to 0.60 carbon	5.05¢			5.05¢			(Worcester = 5.25¢)								
0.61 to 0.80 carbon	5.65¢			5.65¢			(Worcester = 5.85¢)								
0.81 to 1.05 carbon	7.15¢			7.15¢			(Worcester = 7.35¢)								
1.06 to 1.35 carbon	9.45¢			9.45¢			(Worcester = 9.65¢)								
MANUFACTURERS' WIRE[9] Bright	3.55¢	3.55¢		3.55¢	3.55¢		(Worcester = 3.65¢, Duluth = 3.60¢)					4.56¢[13]		3.99¢	3.97¢
Galvanized	Add proper size extra and galvanizing extra to Bright Wire Base														
Spring (high carbon)	4.60¢	4.60¢		4.60¢	(Worcester = 4.70¢, Duluth = 4.85¢) (Trenton = 4.85¢)							5.28¢[13]		5.04¢	4.96¢
PILING, Steel sheet	3.30¢	3.30¢				3.30¢								3.75¢	3.72¢

CORROSION AND HEAT RESISTANT STEELS

In cents per pound, f.o.b. basing point

Basing Point	Chromium Nickel		Straight Chromium			
	No. 304	No. 302	No. 410	No. 430	No. 442	No. 446
Ingot, P'gh, Chi, Canton, Balt, Reading, Ft. Wayne, Phila	Subject to negotiation			Subject to negotiation		
Blooms, P'gh, Chi, Canton, Phila, Reading, Ft. Wayne, Balt	Subject to negotiation			Subject to negotiation		
Slabs, P'gh, Chi, Canton, Balt, Phila, Reading	Subject to negotiation			Subject to negotiation		
Billets, P'gh, Chi, Canton, Watervliet, Syracuse, Balt	Subject to negotiation			Subject to negotiation		
Billets, forging, P'gh, Chi, Canton, Dunkirk, Balt, Phila, Reading, Water, Syracuse, Ft. Wayne, Titusville	23.00	22.50	17.50	17.50	21.00	25.50
Bars, h-r, P'gh, Chi, Canton, Dunkirk, Watervliet, Syracuse, Balt, Phila, Reading, Ft. Wayne, Titusville	27.50	26.00	20.50	21.00	24.50	30.00
Bars, c-f, P'gh, Chi, Cleve, Canton, Dunkirk, Syracuse, Balt, Phila, Reading, Ft. Wayne, Watervliet	27.50	26.00	20.50	21.00	24.50	30.00
Plates, P'gh, Middletown, Canton	31.50	29.50	23.50	24.00	28.00	33.00
Shapes, structural, P'gh, Chi	27.50	26.00	20.50	21.00	24.50	30.00
Sheets, P'gh, Chi, Middletown, Canton, Balt	39.00	37.00	29.00	31.50	35.50	39.50
Strip, h-r, P'gh, Chi, Reading, Canton, Youngstown	25.50	23.50	18.50	19.00	26.00	38.00
Strip, c-r, P'gh, Cleve, Newark, N. J., Reading, Canton, Youngstown	32.50	30.50	24.00	24.50	35.00	56.50
Wire, c-d, Cleve, Dunkirk, Syracuse, Balt, Reading, Canton, P'gh, Newark, N. J., Phila, Ft. Wayne	27.50	26.00	20.50	21.00	24.50	30.00
Wire, flat, c-r, Cleve, Balt, Reading, Dunkirk, Canton	32.48	30.30	23.80	24.34	34.62	56.26
Rod, h-r, Syracuse	27.05	25.97	20.02	20.56	24.34	29.75
Tubing, seamless, P'gh, Chi, Canton (4 to 8 in.)	72.09	72.09	.....	68.49	.....	.....

TOOL STEEL

*(F.o.b. Pittsburgh, Bethlehem, Syracuse, Dunkirk. *Also Canton, Ohio)*

W	Cr	V	Mo	Co	Base Per lb
18	4	1	—	—	82¢
18	4	1	—	5	$1.29
18	4	2	—	—	93¢
1.5	4	1.5	8	—	59¢
6	4	2	6	—	63¢

High-carbon-chromium* ..... 47¢
Oil hardening manganese* ..... 26¢
Special carbon* ..... 24¢
Extra carbon* ..... 20¢
Regular carbon* ..... 17¢

Warehouse prices on and east of Mississippi are 2¢ per lb. higher; west of Mississippi, 4¢ higher.

ELECTRICAL SHEETS

Base, all grades f.o.b. Pittsburgh

	Per lb
Field grade	4.50¢
Armature	4.80¢
Electrical	5.30¢
Motor	6.05¢
Dynamo	6.75¢
Transformer 72	7.25¢
Transformer 65	7.95¢
Transformer 58	8.65¢
Transformer 52	9.45¢

F.o.b. Chicago and Gary, field grade through motor; f.o.b. Granite City, add 10¢ per 100 lb on field grade to and including dynamo.

RAILS, TRACK SUPPLIES

(F.o.b. mill)

Standard rails, heavier than 60 lb
No. 1 O.H., per 100 lb $2.75
Angle splice bars, 100 lb 3.25
(F.o.b. basing points) *per 100 lb*
Light rails (from billets) $3.10
Light rails (from rail steel), f.o.b. Williamsport, Pa. 3.45

	Base per lb
Cut spikes	4.85¢
Screw spikes	6.90¢
Tie plate, steel	3.05¢
Tie plates, Fittsburg, Calif.	3.20¢
Track bolts	7.00¢
Track bolts, heat treated, to rail roads	7.25¢

Basing points, light rails, Pittsburgh, Birmingham; cut spikes and tie plates—Pittsburgh, Chicago, Portsmouth, Ohio; Weirton, W. Va.; St. Louis, Kansas City, Minnequa, Colo.; Birmingham and Pacific Coast ports; tie plates alone—Steelton, Pa.; Buffalo. Cut spikes alone—Youngstown, Lebanon, Pa.; Richmond.

ROOFING TERNEPLATE

(F.o.b. Pittsburgh, 112 sheets)

	20x14 in.	20x28 in.
8-lb coating I.C.	$7.05	$14.10

CLAD STEEL

Base prices, cents per pound

Stainless-clad	Plate	Sheet
No. 304, 20 pct, f.o.b. Pittsburgh, Washington, Coatesville, Pa.	*24.00	*22.00
Nickel-clad 10 pct, f.o.b. Coatesville, Pa.	21.50	....
Inconel-clad 10 pct, f.o.b. Coatesville	30.00	....
Monel-clad 10 pct, f.o.b. Coatesville	29.00	....
Aluminized steel Hot dip, 20 gage, f.o.b. Pittsburgh	....	9.00

* Includes annealing and pickling, or sandblasting.

MERCHANT WIRE PRODUCTS

To the dealer f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham, Duluth

	Base per keg	Delivered San Francisco
Standard & coated nails	$4.25†	$5.33
Galvanized nails‡‡	4.00†	5.08
Cut nails, carloads, Pittsburgh base	5.30*	....

†10¢ additional at Cleveland, 35¢ at Worcester. ‡‡ Plus $2.75 per 100 lb galvanizing extra. *Less 20¢ to jobbers.

	Base per 100 lb	
Annealed fence wire	$4.20‡	$5.21
Annealed galv. fence wire	4.65‡	5.66

‡10¢ additional at Worcester.

To the dealer f.o.b. Pittsburgh, Chicago, Birmingham

	Base column	
Woven wire fence*	91	114
Fence posts, carloads	90††	...
Single loop bale ties	91	115
Galvanized barbed wire**	101	121
Twisted barbless wire	101	...

* 15½ gage and heavier. ** On 80-rod spools in carload quantities. ††Pittsburgh, Duluth.

HIGH STRENGTH, LOW ALLOY STEELS

base prices, cents per pound

Steel	Alde-cor	Corten	Double Strength No. 1	Dyn-alloy	HI Steel	Mayari R	Otis-coloy	Yoloy	NAX High Tensile
Producer	Repub-lic	Carnegie-Illinois, Republic	Repub-lic	Alan Wood	Inland	Bethle-hem	Jones & Laughlin	Youngs-town Sheet & Tube	Great Lakes Steel
Plates	4.55	4.55	4.55	4.55	4.55	4.55	4.55	4.55	4.55
Sheets									
Hot-rolled	4.30	4.30	4.30	4.30	4.30	4.30	4.30	4.30	4.30
Cold-rolled	5.30	5.30	5.30	....	5.30	5.30	5.30	5.30	5.30
Galvanized	....	5.85	....	....	....	6.00	....	....	....
Strip									
Hot-rolled	4.30	4.30	4.30	....	4.30	4.30	4.30	4.30	4.30
Cold-rolled	....	....	5.30	....	....	5.30	5.30	5.30	5.30†
Shapes	....	4.30	....	....	4.30	4.30	4.30	4.30	....
Beams	....	4.30	....	....	....	4.30	....	....	....
Bars									
Hot-rolled	4.45	4.45	4.45	....	....	4.45	4.45	4.45	4.45
Cold-rolled	....	....	....	....	....	....	....	....	....
Bar shapes	....	4.45	....	....	4.45	4.45	4.45	4.45	....

† Pittsburgh, add 0.10¢ at Chicago and Gary.

PIPE AND TUBING

Base discounts. f.o.b. Pittsburgh and Lorain, steel buttweld and seamless. Others f.o.b. Pittsburgh only
Base price, $286.00 per net ton

Standard, threaded & coupled

Steel, buttweld	Black	Galv.
⅛-in.	50½	34½
¼-in.	53½	38½
1-in.	56	41½
1¼-in.	56½	42
1½-in.	57	42½
2 in.	57½	43
2½ and 3-in.	58	43½
Wrought Iron, buttweld		
⅛-in.	+ 7	+29
¼-in.	2½	+19
1 and 1¼-in.	8	+11
1½-in.	13½	+ 7½
2-in.	14	+ 7
Steel, lapweld		
2-in.	49	34
2½ and 3-in.	52	37
3½ to 6-in.	54	39
Steel, seamless		
2-in.	48	33
2½ and 3-in.	51	36
3½ to 6-in.	53	38
Wrought Iron, lapweld		
2-in.	5½	+14½
2½ to 3½-in.	8	+10½
4-in.	12	+ 5
4½ to 8-in.	10	+ 6½

Extra Strong, plain ends

Steel, buttweld		
⅛-in.	49½	35
¼-in.	53½	39
1-in.	55½	42
1¼-in.	56	42½
1½-in.	56½	43
2-in.	57	43½
2½ and 3-in.	57½	44
Wrought Iron, buttweld		
⅛-in.	+ 2½	+23
¼-in.	3½	+17
1 to 2-in.	13	+ 7
Steel, lapweld		
2-in.	43	34
2½ and 3-in.	52	38
3½ to 6-in.	55½	41½
Steel, seamless		
2-in.	47	33
2½ and 3-in.	51	37
3½ to 6-in.	54½	40½
Wrought Iron, lapweld		
2-in.	8½	+11
2½ to 4-in.	17½	+ ½
4½ to 6-in.	13	+ 5

Basing discounts for standard pipe are for threads and couplings. For threads only, buttweld, lapweld and seamless pipe, one point higher discount (lower price) applies. For plain ends, buttweld, lapweld and seamless pipe 3-in. and smaller, three points higher discount (lower price) applies, while for lapweld and seamless 3½-in. and larger four points higher discount (lower price) applies. F.o.b. Gary prices are one point lower discount on all buttweld. On buttweld and lapweld steel pipe, jobbers are granted a discount of 5 pct. On l.c.l. shipments, prices are determined by adding 25 pct and 30 pct and the carload freight rate to the base card.

BOILER TUBES

Seamless steel and electric welded commercial boiler tubes and locomotive tubes, minimum wall. Net base prices per 100 ft, f.o.b. Pittsburgh in carload lots, cut length 4 to 24 ft, inclusive.

OD in.	Gage BWG	Seamless Hot-Rolled	Seamless Cold-Drawn	Electric Weld Hot-Rolled	Electric Weld Cold-Drawn
2	13	$16.67	$19.99	$16.17	$19.39
2½	12	22.42	26.87	21.75	26.06
3	12	24.93	29.90	24.18	29.00
3½	11	31.17	37.39	30.23	36.27
4	10	38.69	46.38	37.53	44.99

CAST IRON WATER PIPE

Per net ton

6-in. to 24-in. del'd Chicago $86.12
6-in. to 24-in. del'd New York..... 84.18
6-in. to 24-in., Birmingham 74.50
6-in. and larger, f.o.b. cars, San Francisco, Los Angeles for all rail shipment; rail and water shipment less 100.90

Class "A" and gas pipe, $5 extra; 4-in. pipe is $5 a ton above 6-in.

BOLTS, NUTS, RIVETS, SET SCREWS

Consumer Prices

(Bolts and nuts f.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Base discount less case lots

Machine and Carriage Bolts

Percent Off List

½ in. & smaller x 6 in. & shorter.. 45
9/16 & ⅝ in. x 6 in. & shorter..... 46
¾ in. & larger x 6 in. & shorter.... 43
All diam, longer than 6 in. 41
Lag, all diam over 6 in. long..... 44
Lag, all diam x 6 in. & shorter..... 46
Plow bolts 54

Nuts, Cold Punched or Hot Pressed

(Hexagon or Square)

½ in. and smaller 43
9/16 to 1 in. inclusive 42
1⅛ to 1½ in. inclusive 40
1⅝ in. and larger 35

On above bolts and nuts, excepting plow bolts, additional allowance of 15 pct for full container quantities. There is an additional 5 pct allowance for carload shipments.

Semifin. Hexagon Nuts	USS	SAE
7/16 in. and smaller		46
½ in. and smaller	44	..
½ in. through 1 in.		44
9/16 in. through 1 in.	43	..
1⅛ in. through 1½ in. ..	41	42
1⅝ in and larger	35	..

In full case lots, 15 pct additional discount. For 200 lb or more, freight allowed up to 50¢ per 100 lb, based on Cleveland, Chicago, Pittsburgh.

Stove Bolts

Packages, nuts separate .... 65 and 10
In bulk 75

On stove bolts freight allowed up to 65¢ per 100 lb based on Cleveland, Chicago, New York on lots of 200 lb or over.

Large Rivets *(½ in. and larger)*

Base per 100 lb

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham $5.65
F.o.b. Lebanon, Pa. 5.80

Small Rivets *(7/16 in. and smaller)*

Percent Off List

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham 55

Cap and Set Screws

(In packages) *Percent Off List*

Hexagon head cap screws, coarse or fine thread, up to and incl. 1 in. x 6 in., SAE 1020, bright 53
¾ to 1 in. x 6 in., SAE 1035, heat treated 44
Set screws, cup and oval points 57
Milled studs 43
Flat head cap screws, listed sizes.. 16
Fillister head cap, listed sizes..... 37

Freight allowed up to 65¢ per 100 lb based on Cleveland, Chicago or New York on lots of 200 lb or over.

FLUORSPAR

Metallurgical grade, f.o.b. producing plant.

Effective CaF_2 Content:	*Base price per short ton*
70% or more	$35.00
65% but less than 70%	34.00
60% but less than 65%	33.00
Less than 60%	32.00

LAKE SUPERIOR ORES

(51.50% Fe, Natural Content, Delivered Lower Lake Ports)

Per Gross Ton

Old range, bessemer $5.95
Old range, nonbessemer 5.80
Mesabi, bessemer 5.70
Mesabi, nonbessemer 5.55
High phosphorus 5.55

Prices quoted retroactive to Jan. 1, 1947.

METAL POWDERS

Prices in cents per pound in ton lots, f.o.b. shipping point.

Brass, minus 100 mesh.....24¢ to 28½¢
Copper, electrolytic, 100 and 325 mesh .....30¢ to 31½¢
Copper, reduced, 150 and 200 mesh .....29¢ to 30½¢
Iron, commercial, 100, 200, 325, mesh 96 + % Fe carlots....10¢ to 17¢
Swedish sponge iron, 100 mesh, c.l.f. N. Y., carlots, ocean bags..7.4¢ to 8.5¢
Iron, crushed, 200 mesh and finer, 90 + % Fe carload lots ..... 8¢
Iron, hydrogen reduced, 300 mesh and finer, 98 + % Fe, drum lots .....63¢ to 80¢
Iron, electrolytic, unannealed, 325 mesh and coarser, 99 + % Fe .....35¢ to 37¢
Iron, electrolytic, annealed minus 100 mesh, 99 + % Fe.... 29¢ to 32¢
Iron carbonyl, 300 mesh and finer, 98-99.8 + % Fe.....90¢ to $1.75
Aluminum, 100, 200 mesh, carlots .....23¢ to 26¢
Antimony, 100 mesh ..... 36.05¢
Cadmium, 100 mesh $2.00
Chromium, 100 mesh and finer.... $1.025
Lead, 100, 200, & 300 mesh 18.50¢ to 23.50¢
Manganese, minus 325 mesh and coarser ..... 49¢
Nickel, 100 mesh ..... 51½¢
Silicon, 100 mesh ..... 26¢
Solder powder, 100 mesh..8½¢ plus metal
Stainless steel, 302, minus 100 mesh...75¢
Tin, 100 mesh ..... 90¢
Tungsten metal powder, 98%-99%, any quantity, per lb..... $3.05
Molybdenum powder, 99%, in 100-lb kegs, f.o.b. York, Pa., per lb. $2.65
Under 100 lb $2.90

COKE

Furnace, beehive (f.o.b. oven) Net Ton	
Connellsville, Pa.	$12.00 to $13.00
Foundry, beehive (f.o.b. oven) Connellsville, Pa.	13.50 to 14.50
Foundry, Byproduct	
Chicago, del'd	$17.10
Chicago, f.o.b.	16.10
New England, del'd	19.75
Seaboard, Kearney, N. J., f.o.b.	17.85
Philadelphia, del'd	16.83
Swedeland, Pa., f.o.b.	15.90
Buffalo, del'd	18.75
Ashland, Ohio, f.o.b.	15.50
Painesville, Ohio, f.o.b.	16.60
Erie, del'd	16.75
Cleveland, del'd	17.90
Cincinnati, del'd	15.39
St. Louis, del'd	18.03
Birmingham, del'd	15.00

REFRACTORIES

(F.o.b. Works)

Fire Clay Brick

Carloads, Per 1000

No. 1, Ohio $64.00
First quality, Pa., Md., Ky., Mo., Ohio 70.00
First quality, New Jersey 75.00
Sec. quality, Pa., Md., Ky., Mo, Ohio 64.00
Sec. quality, New Jersey 59.00
No. 2, Ohio 56.00
Ground fire clay, net ton, bulk.... 10.00

Silica Brick

Pennsylvania and Birmingham ...$70.00
Chicago District and Alabama 79.00
Silica cement, net ton (Eastern)... 12.00
East Chicago 13.00

Chrome Brick

Per Net Ton

Standard chemically bonded, Balt., Plymouth Meeting, Chester $59.00

Magnesite Brick

Standard, Balt. and Chester $81.00
Chemically bonded, Baltimore 70.00

Grain Magnesite

Domestic, f.o.b. Balt. and Chester in bulk $44.50
Domestic, f.o.b. Chewelah, Wash., in bulk 24.00
in sacks 28.00

Dead Burned Dolomite

F.o.b. producing points in Pennsylvania, West Virginia and Ohio, per net ton, bulk. Midwest; add 10¢; Missouri Valley; add 20¢..$11.05

WAREHOUSE PRICES

Base prices, delivered metropolitan areas, per 100 lb.

CITIES	SHEETS			STRIP		PLATES	SHAPES	BARS		ALLOY BARS			
	Hot-Rolled	Cold-Rolled (15 gage)	Galvanized (10 gage)	Hot-Rolled	Cold-Rolled		Standard Structural	Hot-Rolled	Cold-Finished	Hot-Rolled, A 4615 As-rolled	Hot-Rolled, A 4140-50 Ann.	Cold-Drawn, A 4615 As-rolled	Cold-Drawn, A 4140-50 Ann.
Philadelphia	$4.47	$5.73	$5.72	$4.78	$5.33	$4.82	$4.55	$4.83	$5.53	$8.34	$8.44	$9.88	$9.95
New York	4.71	5.72[1]	6.11	5.03	5.86	5.06	4.75	5.02	5.57	8.40	8.50	9.92	10.02
Boston	4.76	5.63[12]	6.16[12]	4.76	6.73	5.11	4.82	4.98	5.63	8.62	8.72	9.98	10.08
Baltimore	4.31	....	5.56	4.76	....	4.76	4.68	4.81	5.51	....	....	....	....
Norfolk	4.80	....	....	5.20	....	5.05	5.05	5.10	5.90	....	....	....	....
Chicago	4.25	5.10	5.65	4.35	5.45	4.60	4.40	4.40	5.10	8.05	8.15	9.30	9.40
Milwaukee	4.423	5.279[1]	5.829	4.523	5.623[5]	4.779	4.579	4.579	5.279	8.373	8.473	9.629	9.729
Cleveland	3.95	4.55	5.238	4.188	5.00	4.25†	4.311	4.10	5.10	8.33	8.43	9.30	9.49
Buffalo	4.25	5.10	6.00	4.70	5.65[5]	4.95	4.40	4.40	5.10	8.05	8.15	9.30	9.40
Detroit	4.35	5.20	6.02	4.72	5.63	4.88†	4.77	4.50	5.22	8.50	8.60	9.73	9.78
Cincinnati	4.51	5.19	5.74	4.74	5.70	4.95	4.79	4.75	5.45	....	....	....	....
St. Louis	4.58	5.43[1]	5.87	4.68	5.82	4.88	4.73	4.73	5.47	8.57	8.67	9.82	9.92
Pittsburgh	4.25	5.10[1]	5.65	4.35	....	4.60	4.40	4.40	5.10	8.05	8.15	9.30	9.40
St. Paul	4.63	5.48[1]	5.88[2]	4.73[7]	....	4.93[7]	4.78[7]	4.78[7]	5.91[6]	....	....	....	....
Omaha	4.868	6.118[1]	6.468	5.168	....	5.418	5.218	5.218	5.918	....	....	....	....
Indianapolis	4.51	5.29	5.84	4.61	5.46	4.86	4.66	4.65	5.36	....	....	....	....
Birmingham	4.45[11]	....	5.65	4.45[11]	....	4.65[11]	4.40[11]	4.40[11]	6.04	....	....	....	....
Memphis	4.82[11]	5.87	6.37	5.02[11]	....	5.17[11]	4.97[11]	4.97[11]	6.12	....	....	....	....
New Orleans	*4.98[11]	6.29[1]	....	5.18[11]	....	5.33[11]	*5.03[11]	*5.13[11]	6.29[6]	....	....	....	....
Houston	5.30	....	6.60	5.25	....	5.35	5.15	5.30	6.60	8.75[16]	8.55[16]	9.70[16]	9.80[16]
Los Angeles	5.65	7.35[1]	7.30	5.95	8.70[5]	5.40	5.25	5.40	7.25[14]	9.35[15]	9.35[15]	10.95[15]	11.05[15]
San Francisco	5.20[8]	6.65	6.85	5.50[8]	....	5.30	5.20	5.05	7.35[10]	9.55[15]	9.35[15]	10.95[15]	11.05[15]
Seattle	5.45[4]	7.25[2]	6.85	5.60[4]	....	5.60[4]	5.25[4]	5.45[4]	7.45[14]	....	9.75[6]	....	11.10[6]
Portland	5.30[4]	7.10[2]	6.70	5.60[4]	....	5.45[4]	5.25[4]	5.55[4]	7.45[14]	....	....	....	....
Salt Lake City	6.40	....	7.85	6.70	....	6.20	6.35	6.55	7.55	....	....	....	....

BASE QUANTITIES

Standard unless otherwise keyed on prices.

HOT-ROLLED: Sheets, strip, plates, shapes and bars, 400 to 1999 lb.

COLD-ROLLED: Sheets, 400 to 1999 lb; strip, extras on all quantities: bars 1000 lb and over.

ALLOY BARS: 1000 to 1999 lb.

GALVANIZED SHEETS: 450 to 1499 lb.

EXCEPTIONS: (1) 400 to 1499 lb; (2) 450 to 1499 lb; (3) 300 to 4999 lb; (4) 300 to 9999 lb; (5) 2000 lb and over; (6) 1000 lb and over; (7) 400 to 14,999 lb; (8) 400 lb and over; (9) 450 to 1499 lb; (10) 500 to 999 lb; (11) 400 to 3999 lb; (12) 450 to 3749 lb; (13) 400 to 1999 lb; (14) 1500 lb and over; (15) 1000 to 4999 lb; (16) 4000 lb and over.

* Add 46¢ for sizes not rolled in Birmingham.

† Up to ¾ in. thick and 90 in. wide.

PIG IRON PRICES

Dollars per gross ton. Delivered prices represent minimums. Delivered prices do not include 3 pct tax on freight.

BASING POINT PRICES

Basing Point	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.
Bethlehem	37.00	37.50	38.00	38.50	.....
Birmingham	32.88-35.88	33.38-38.38	....	.....	.....
Buffalo	36.00-39.50*	36.00-40.00*	36.50-40.50*	.....	.....
Chicago	35.50	36.00	36.50	37.00	.....
Cleveland	35.50-40.75*	36.00-41.25	36.50-41.75*	.....	.....
Duluth	36.00	36.50	37.00	37.50	.....
Erie	35.50	36.00	36.50	37.00	.....
Everett	.....	45.00	45.50	.....	.....
Granite City	36.50	37.00	37.00	.....	.....
Neville Island	36.00	36.50	36.50	37.00	.....
Provo	37.00	37.50	....	.....	.....
Sharpsville	36.00	36.50	36.50	37.00	.....
Steelton	37.00	.....	.....	.....	42.00
Struthers, Ohio	36.50	.....	.....	.....	.....
Swedeland	41.00	41.50	42.00	42.50	.....
Toledo	35.50	36.00	36.50	37.00	.....
Troy, N. Y.	37.00	37.50	38.00	38.50	42.00
Youngstown	36.00	36.50	36.50	37.00	.....

DELIVERED PRICES (BASE GRADES)

Consuming Point	Basing Point	Freight Rate	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.
Boston	Everett	$0.50 Arb.	.....	45.50	46.00	.....	
Boston	Steelton	5.30	....	....	....	....	47.38
Brooklyn	Bethlehem	3.30	40.30	40.80	41.30	41.80	.....
Cincinnati	Birmingham	5.36	38.24-41.25	38.74-41.74	....	.....	.....
Jersey City	Bethlehem	2.02	39.02	39.52	40.02	40.52	.....
Los Angeles	Provo	6.53	43.53	44.03	....	.....	.....
Mansfield	Cleveland-Toledo	2.56	38.06-43.31*	38.56-43.81*	39.06-44.31*	39.56	.....
Philadelphia	Bethlehem	1.84	38.84	39.34	39.84	40.34	.....
Philadelphia	Swedeland	1.11	42.11	42.61	43.11	43.61	.....
Philadelphia	Steelton	2.38	39.38	....	....	.....	44.38
San Francisco	Provo	6.53	43.53	44.03	.....	.....	.....
Seattle	Provo	6.53	43.53	44.03	.....	.....	.....
St. Louis	Granite City	0.75 Arb.	37.25	37.75	37.75	.....	.....

* Republic Steel Corp. price. Basis: Average price of No. 1 hvy. mlt. steel scrap at Cleveland or Buffalo respectively as shown in last week's issue of THE IRON AGE. Price is effective until next Sunday midnight.

Basing point prices are subject to switching charges; silicon differentials (not to exceed 50¢ per ton for each 0.25 pct silicon content in excess of base grade which is 1.75 to 2.25 pct); phosphorus differentials, a reduction of 38¢ per ton for phosphorus content of 0.70 pct and over; manganese differentials, a charge not to exceed 50¢ per ton for each 0.50 pct manganese content in excess of 1.00 pct. $2 per ton extra may be charged for 0.5 to 0.75 pct nickel content and $1 per ton extra for each additional 0.25 pct nickel.

Silvery iron (blast furnace) silicon 6.00 to 6.50 pct, C/L per g.t., f.o.b. Jackson, Ohio—$45.50; f.o.b. Buffalo—$46.75. Add $1.25 per ton for each additional 0.50 pct Si, up to 12 pct. Add 50¢ per ton for each 0.50 pct Mn over 1.00 pct. Add $1.00 per ton for 0.75 pct or more P. Bessemer ferrosilicon prices are $1.00 per ton above silvery iron prices of comparable analysis.

Charcoal pig iron base price for low phosphorous $50.00 per gross ton, f.o.b. Lyles, Tenn. Delivered Chicago, $56.04. High phosphorous charcoal pig iron is not being produced.

Ferromanganese

78-82% Mn, maximum contract base price, gross ton, lump size, f.o.b. Baltimore, Philadelphia, New York, Birmingham, Rockwood, Tenn.

Carload lots (bulk)	$145
Less ton lots (packed)	172.00
Delivered Pittsburgh	151.00

$1.70 for each 1% above 82% Mn; penalty, $1.70 for each 1% below 78%.

Briquets—Cents per pound of briquet, freight allowed, 66% contained Mn.

	Eastern	Central	Western
Carload, bulk	8.00	8.25	8.80
Ton lots	9.00	9.60	11.50
Less ton lots	9.40	10.00	11.90

Spiegeleisen

Contract prices, gross ton, lump, f.o.b. Palmerton, Pa.

	16-19% Mn 3% max. Si	19-21% Mn 3% max. Si
Carloads	$46.00	$47.00
F.o.b Pittsburgh	50.00	51.00

Manganese Metal

Contract basis, 2 in. x down, cents per pound of metal, f.o.b. shipping point, freight allowed, eastern zone.

96% min. mn, 0.2% max. C, 1% max. Si, 2% max. Fe.

Carload, bulk	32
L.c.l. lots	34

Electrolytic Manganese

F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, cents per pound.

Carloads	32
Ton lots	34
Less ton lots	36

Low-Carbon Ferromanganese

Contract price, cents per pound Mn contained, lump size, f.o.b. shipping point, freight allowed, eastern zone.

	Carloads	Ton	Less
0.06% max. C. 0.06% P, 90% Mn	23.00	24.10	24.70
0.10% max. C	22.50	23.60	24.20
0.15% max. C	22.00	23.10	23.70
0.30% max. C	21.50	22.60	23.20
0.50% max. C	21.00	22.10	22.70
0.75% max. C, 7.00% max. Si	18.00	19.10	19.70

Silicomanganese

Contract basis, lump size, cents per pound of metal, f.o.b. shipping point, freight allowed, 65-70% Mn, 17-20% Si, 1.5% max. C.

Carload, bulk	7.40
Ton lots	8.45
Briquet, contract basis, carlots, bulk freight allowed, per lb of briquet	7.65
Ton lots	8.65
Less ton lots	9.05

Silvery Iron (electric furnace)

Si 14.01 to 14.50%, $73.00 f.o.b. Keokuk, Iowa; $73.75 f.o.b. Niagara Falls; $70.75, f.o.b. Jackson, Ohio. Electric furnace silvery iron is not being produced at Jackson. Add $1.00 per ton for each additional 0.50% Si up to and including 18%. Add 50¢ per ton for each 0.50 pct Mn over 1 pct.

Silicon Metal

Contract price, cents per pound contained Si, lump size, f.o.b. shipping point, freight allowed, for ton lots packed.

	Eastern	Central	Western
96% Si, 2% Fe	18.50	19.85	21.60
97% Si, 1% Fe	18.00	20.25	22.00

Ferrosilicon Briquets

Contract price, cents per pound of briquet, bulk, f.o.b. shipping point, freight allowed to destination, 40% Si. 1 lb Si briquets.

	Eastern	Central	Western
Carload, bulk	4.80	5.05	5.25
Ton lots	5.80	6.40	6.70
Less ton lots	6.20	6.80	7.10

Electric Ferrosilicon

Contract price, cents per pound contained Si, lump size in carloads, f.o.b. shipping point, freight allowed.

	Eastern	Central	Western
25% Si	15.50	....	....
50% Si	8.80	9.30	9.50
75% Si	11.20	11.50	12.25
80-90% Si	12.70	13.00	13.75
90-95% Si	14.35	14.65	15.35

Ferrochrome (65-72% *Cr, 2% max. Si*)

Contract prices, cents per pound, contained Cr, lump size in carloads, f.o.b. shipping point, freight allowed.

	Eastern	Central	Western
0.06% C	25.00	25.40	26.00
0.10% C	24.50	24.90	25.50
0.15% C	24.00	24.40	25.00
0.20% C	23.75	24.15	24.25
0.50% C	23.50	23.90	24.00
1.00% C	23.00	23.40	23.50
2.00% C	22.50	22.90	23.00
65-69% Cr, 4.9% C	17.60	18.00	18.15
62-66% Cr. 4-6% C. 6-9% Si	18.60	19.00	19.15

Briquets — Contract price, cents per pound of briquet, f.o.b. shipping point, freight allowed, 60% chromium.

	Eastern	Central	Western
Carload, bulk	11.10	11.35	11.45
Ton lots	12.00	12.90	13.50
Less ton lots	12.40	13.30	13.90

High-Nitrogen Ferrochrome

Low-carbon type: 67-72% Cr, 0.75% N. Add 2¢ per lb to regular low carbon ferrochrome price schedule. Add 2¢ for each additional 0.25% N.

S. M. Ferrochrome

Contract price, cents per pound chrominum contained, lump sie, f.o.b. shipping point, freight allowed.

High carbon type: 60-65% Cr, 4-6% Si, 4-6% Mn, 4-6% C.

	Eastern	Central	Western
Carload	18.70	19.10	19.25
Ton lots	19.90	21.20	22.00
Less ton lots	20.60	21.90	22.70

Low carbon type: 62-66% Cr, 4-6% Si, 4-6% Mn, 1.25% max. C.

	Eastern	Central	Western
Carload	23.00	23.40	23.50
Ton lots	24.35	25.00	26.20
Less ton lots	25.35	26.00	27.20

Chromium Metal

Contract prices, cents per lb, chromium contained, carload, f.o.b. shipping point, freight allowed, 97% min. Cr, 1% max. Fe.

	Eastern	Central	Western
0.20% max. C	91.00	92.50	93.75
0.50% max. C	87.00	88.50	89.75
9.00% min. C	87.50	89.00	91.25

Calcium—Silicon

Contract price per lb of alloy, lump, f.o.b. shipping point, freight allowed.

30-35% Ca, 60-65% Si, 3.00% max. Fe or 28-32% Ca, 60-65% Si, 6.00% max. Fe.

	Eastern	Central	Western
Carloads	15.50	16.00	18.05
Ton lots	17.60	18.35	20.50
Less ton lots	18.60	19.35	21.50

Calcium—Manganese—Silicon

Contract prices, cents per lb of alloy, lump, f.o.b. shipping point, freight allowed.

16-20% Ca, 14-18% Mn, 53-59% Si.

	Eastern	Central	Western
Carloads	16.75	17.25	19.30
Ton lots	18.35	19.70	21.45
Less ton lots	19.85	20.70	22.45

Calcium Metal

Eastern zone contract prices, cents per pound of metal, f.o.b. shipping point, freight allowed. Add 1.5¢ for central zone; 3.5¢ for western zone.

	Cast Turnings	Distilled
Ton lots	$1.85	$2.70	$3.40
Less ton lots	2.20	3.05	4.20

CMSZ

Contract price, cents per pound of alloy, f.o.b. shipping point, freight allowed.

Alloy 4: 45-49% Cr, 4-6% Mn, 18-21% Si, 1.25-1.75% Zr. 3.00-4.5% C.

Alloy 5: 50-56% Cr, 4-6% Mn, 13.50-16.00% Si, 0.75 to 1.25% Zr, 3.50-5.00% C.

	Eastern	Central	Western
Ton lots	17.25	18.35	20.30
Less ton lots	18.00	19.10	21.05

SMZ

Contract price, cents per pound of alloy, f.o.b. shipping point, freight allowed. 60-65% Si, 5-7% Mn. 5-7% Zr, 20% Fe, ⅛ in. x 12 mesh.

	Eastern	Central	Western
Ton lots	15.05	16.15	18.10
Less ton lots	15.80	16.90	18.85

Other Ferroalloys

Ferrotungsten, standard, lump or ⅛ x down, packed, f.o.b. plant Niagara Falls, Washington, Pa. York, Pa., per pound contained W, 5 ton lots, freight allowed	$2.50
Ferrovanadium, 35-55%, contract basis, f.o.b. plant, freight allowances, per pound contained V.	
Openhearth	$2.90
Crucible	3.00
High speed steel (Primos)	3.10
Vanadium pentoxide, 88-92% V_2O_5 technical grade, contract basis, per pound contained V_2A_5	$1.30
Ferrocolumbium, 50-60%, contract basis, f.o.b. plant, freight allowed, per pound contained Cb	
Ton lots	$2.50
Less ton lots	$2.55
Ferromolybdenum, 55-75%, f.o.b Langeloth, Washington, Pa., per pound contained Mo.	95¢
Calcium molybdate, 40-45%, f.o.b Langeloth, Washington, Pa., Per pound contained Mo.	80¢
Molybdenum oxide briquets, 48-52% Mo, f.o.b. Langeloth, Pa., per pound contained Mo.	80¢
Molybdenum oxide, in cans, f.o.b. Langeloth and Washington, Pa., per pound contained Mo.	80¢
Ferrotitanium, 40-45%, 0.10% C max., f.o.b. Niagara Falls, N. Y. ton lots, per pound contained Ti	$1.33
Less ton lots	$1.35
Ferrotitanium, 20-25%, 0.10% C max., ton lots, per pound contained Ti	$1.35
Less ton lots	$1.40
High carbon ferotitanium, 15-20%, 6-8% C, contract basis, f.o.b. Niagara Falls, freight allowed, carloads, per net ton	$142.50
Ferrophosphorus, electrolytic, 23-26%, carlots, f.o.b. (Siglo) Tenn., $3 unitage per gross ton	$65.00
Zirconium, 35-40%, contract basis, f.o.b. plant, freight allowed, per pound of alloy. Carload lots	18.40¢
Zirconium, 12-15%, contract basis, lump, f.o.b. plant, freight allowed, per pound of alloy Carload, bulk	6.00¢
Alsifer, 20% Al, 40% Si, 40% Fe, contract basis, f.o.b. Suspension Bridge, N. Y.	
Carload	6.90¢
Ton lots	7.40¢
Simanal, 20% Si, 20% Mn, 20% Al, contract basis, f.o.b. Philo, Ohio, freight allowed, per pound	
Car lots	9.00¢
Ton lots	9.75¢

Boron Agents

Contract prices per pound of alloy, f.o.b. shipping point, freight allowed. Ferroboron, 17.50% min. B, 1.50% max. Si, 0.50% max. Al, 0.50% max. C.

	Eastern	Central	Western
Less ton lots	$1.30	$1.3075	$1.329

Manganese — Boron 75.00% Mn, 15-20% B, 5% max. Fe, 1.50% max. Si, 3.00% max C.

Ton lots	$1.89	$1.903	$1.935
Less ton lots	2.01	2.023	2.044

Nickel—Boron 15-18% B, 1.00% max. Al, 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni.

Less ton lots	$1.80	$1.8125	$1.8445

Silcaz, contract basis, f.o.b. plant freight allowed, per pound. Carload lots	37.00¢
Grainal, f.o.b. Bridgeville, Pa., freight allowed on 50 lb and over	
No. 1	93¢
No. 6	63¢
No. 79	45¢
Bortram, f.o.b. Niagara Falls	
Ton lots, per pound	45¢
Less ton lots, per pound	50¢
Carbortam, f.o.b., Suspension Bridge, N. Y., freight allowed, Ti 15—17%, B 0.90—1.15%, Si 2.5—3.0% Al 1.0—2.0%. Ton lots, per pound	8.0¢